11. *A Revision of the Notonectidae and Corixidae of South Africa.*—By G. Evelyn Hutchinson, M.A., F.L.S., F.E.S. (sometime Senior Lecturer in Zoology, the University of the Witwatersrand, Johannesburg).

(With Plates XXVII–XLI.)

INDEX.

PAGE
I. INTRODUCTION . . . 360

II. SYSTEMATIC PART . . 361
Fam. NOTONECTIDAE . 361
Subfam. Notonectinae n. . 362
Tribe Notonectini n. . 362
Notonecta L. . . . 362
Subgenus *Notonecta* L. . 362
,, *Paranecta* n. . 363
N. (*P.*) *lactitans* Kirk. . 365
Enithares Spin. . . . 368
E. v-flavum Reut. . . 369
E. chinai Jacz. . . . 371
E. sobria Stål . . . 372
form *danae* n. . . 374
Tribe Anisopini . . 376
Anisops Spin. . . . 376
Subgenus *Anisops* Spin. . 378
,, *Anisopoides* n. . 378
,, *Micranisops* n. . 377
Anisops (*A.*) *sardea* H.S. . 381
,, ,, *pellucens* Gerst. 384
,, ,, *letitia* n. sp. . 385
,, ,, *gracilis* n. sp. . 386
,, ,, *poweri* n. sp. . 389
,, ,, *leesoniana* n. sp. 390
,, ,, *debilis* Gerst. . 391
,, ,, *varia* Fieb. . 393
,, ,, *varia varia* Fieb. . . 396
,, ,, *varia scutellata* Fieb. . . 396
,, ,, *hypatia* n. sp. . 399

PAGE
Anisops (*A.*) *psyche* Hutch. 400
,, ,, *praetexta* n. sp. 402
,, ,, *jaczewskii* Hutch. 403
,, (*Aoid.*) *aglaia* n. sp. 404
,, (*M.*) *apicalis* Stål . 406
Nychia Stål . . . 408
N. limpida Stål . . 409
,, *limpida limpida* Stål 409
,, ,, ,, form *sappho* Kirk. . 411
,, *limpida bantu*, n. subsp. . . 411
Subfam. Pleinae . . 415
Plea Leach . . . 415
,, *pullula* Stål . . 417
,, *piccanina* n. sp. . . 419
Fam. CORIXIDAE . . 420
Subfam. Micronectinae . 422
Micronecta Kirk. . . 422
M. scutellaris Stål . . 424
M. perdita n. sp. . . 426
M. hessei n. sp. . . . 427
M. gorogaiqua n. sp. . . 428
M. winifreda n. sp. . . 429
M. druryana n. sp. . . 430
M. dorothea n. sp. . . 431
M. butleriana n. sp. . . 432
M. monomatapae n. sp. . 433
M. browni n. sp. . . 434
M. quewalepele n. sp. . 435
M. simillima n. sp. . . 436
M. bleekiana n. sp. . . 437

PAGE
M. citharistia n. sp. . . 438
M. uvarovi Jacz. . . 439
M. piccanin n. sp. . . 440
form *piccanin* n. . . 441
form *pardina* n. . . 442
form *tigrina* n. . . 443
form *audax* n. . . 443
form *variegata* n. . . 443
form *nigroclavata* n. . 443
form *perversa* n. . . 444
M. youngiana n. sp. . . 444
Subfam. CORIXINAE . . 445
Agraptocorixa Kirk. . . 445
A. swierstrai n. sp. . . 446
Sigara Fabr. . . . 448
Subgenus *Sigara* Fabr. . 448

PAGE
S. (*S.*) *sjöstedti* (Kirk.) . 449
„ „ *meridionalis* (Wallgr.) 451
„ „ *contortuplicata* (Kirk.) 453
„ „ *ceres* n. sp. . . 456
III. ZOOGEOGRAPHY . . 457
IV. ECOLOGY 461
1. Rainfall and Colonisation 461
2. Standing and Running Water . . . 462
3. Temperature . . 464
4. Illumination. . . 466
5. Chemical Composition . 467
6. Vegetation . . . 468
7. Conclusion . . . 469
V. EXPLANATION OF PLATES 470

I.—INTRODUCTION.

THE present study is based on the following material:—The collections of the South African Museum (S.A.M.), Transvaal Museum (T.M.), and the Albany Museum (A.M.), and unworked African Notonectidae in the British Museum (B.M.); on a large collection made by Grace E. Pickford (G.E.P.), chiefly in the East Cape Province in 1926, and in the East Cape Province and Orange Free State, in company with Miss D. F. Bleek, in 1928; on much material forwarded from time to time by Letitia M. Starke (L.M.S.), chiefly from the Cape Peninsula and Flats; and on collections made in various parts of South Africa by myself (G.E.H.). In addition to these main sources various South African biologists have forwarded specimens which are acknowledged in the text. My best thanks are due to the following, who have entrusted to me collections and specimens in their charge:—Dr. E. L. Gill, Dr. A. J. Hesse, Dr. C. J. Swierstra, Mr. G. van Son, Mr. J. Hewitt, Dr. E. Warren, Dr. H. Scott, and Mr. W. E. China. To the latter I am especially indebted for valuable information on nomenclature, and for very numerous transcriptions of descriptions not available in South Africa, without which the work would have been impossible. The systematic work was intended as a preliminary to a more extended ecological study, which now, unfortunately, cannot be completed. Such information as has been collected on the zoogeography and ecology of these insects is presented in separate sections after the systematic part. The other groups of aquatic Heteroptera were collected with the families discussed in this paper; the surface bugs will be forwarded to Professor T. Esaki, and other families worked out as opportunity permits. The large number of new species hardly calls for an apology seeing that no adequate investigation of these insects has ever before been made in South Africa.

The somewhat unsatisfactory definition of South Africa usual in works on zoogeography is accepted, *i.e.* that part of Africa south of the Zambesi and Kunene Rivers. The present paper therefore attempts the consideration of the Notonectids and Corixids of the Union of South Africa, Portuguese East Africa, South Rhodesia, the Bechuanaland Protectorate and Caprivi Strip, and South-West Africa.

Unfortunately for the naturalist interested in problems other than pure systematics, the majority of the species are hard to distinguish except on sexual characters. It is therefore of great importance to take enough specimens to ensure ♂♂ being present from every locality. The synonymy makes no claim to be exhaustive, only references of importance being admitted to the lists. The figures are semi-diagrammatic *camera-lucida* drawings, in which irrelevant hairs are omitted.

The types of all new species in my possession, and a first set of all described ones, will be deposited in the South African Museum; further sets will be sent where possible to the British Museum, to Dr. T. Jaczewski, Professor H. B. Hungerford, and Professor T. Esaki.*

II.—SYSTEMATIC PART.

1. Fam. NOTONECTIDAE.

Aquatic Hemiptera modified for swimming with the dorsal surface below. Deep bodied, convex dorsally, and more or less triangular in section. Posterior legs natatory and more or less fringed with hairs.

The water boatmen (also known as "back swimmers" in North America) may be easily recognised by the deep body, quite unlike the flattened form of the other families of water bugs, and presumably developed in relation to their habit of swimming upside down.

Two subfamilies are usually recognised:

1. (2) Hind legs flattened and with a conspicuous fringe of hair. Larger species over 4 mm. long. . . . . *Notonectinae.*

2. (1) Hind legs not more flattened than the other pairs, and but little more ciliated. Smaller species under 3 mm. long . *Pleinae.*

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* Since this was written Mr. Hutchinson has presented a large part of his private collection, including the types of the n.spp., to this Museum.—Editor.

Subfam. NOTONECTINAE.

The genera have recently been discussed by Hale (Proc. Linn. Soc., N.S.W., xlix, pt. 4, 1924, p. 462), who groups them according to the number of well-developed antennal joints. Omitting the insufficiently known genera *Martarega* B.-Wh. and *Signoretiella* Berg., stated to have four antennal joints but in facies more allied to *Anisops* and *Nychia*, we may divide the subfamily into two tribes thus :

1. (2) Intermediate femur with a subapical tooth on its posterior margin. Antenna with four well-defined joints. Male genitalia symmetrical . . . . *Notonectini* n.

2. (1) Intermediate femur without a subapical tooth. Antenna with three well-defined joints. Male genitalia asymmetrical *Anisopini* n.

A third tribe may have to be instituted for the two neotropical genera above mentioned.

Tribe NOTONECTINI.

These insects are distinguished from those belonging to the *Anisopini* by their more robust form, and usually by their larger size, as well as by the characters given above. But two genera are known, both occurring within our area.

Pronotum somewhat transverse, anterior angles not foveate *Notonecta* L.

Pronotum very transverse, anterior angles each with a fovea in which lie the antennae . . . . . *Enithares* Spin.

NOTONECTA L.

Notonecta Linnaeus, 1758, Syst. Nat., p. 343.
,, Kirkaldy, 1897, Tr. Ent. Soc. Lond., p. 397.

Moderately robust. Pronotum not very transverse, anterior angles not foveate. (Plate XXVII, fig. 1.)

Wings with Sc well developed and chitinised, marginal for the greater part of its course, then bending down and fusing with Rs. R well chitinised, R_1 very short, not quite meeting Sc. M chitinised to just beyond r-m, which is short and well chitinised. Cu_1, Cu_2, and A_1 chitinised strongly only at the base, A_2 barely indicated, m-cu absent. (Plate XXVII, fig. 3.)

♂ genital capsule (9th abdominal sternite) with or without a ventral digitiform appendage. Parameres symmetrical. Aedeagus with a short chitinous portion supported on the basal plates, apically membranous and subspherical with a small aperture in a depression just anterior to the apex. This wide membranous portion is supported by an internal chitinous stay, which projects up from the inner side of the wall of the basal part (*s*). The structure, as shown in Plate XXVIII, fig. 2, apparently represents the phallosoma of Pruthi (Tr. Ent. Soc. Lond., 1925, p. 181). It is drawn from a preparation of an aedeagus taken from a specimen captured *in copula*, after treatment with potash, and appears to be more expanded than the aedeagi of this genus examined by previous authors. The aedeagus of *Notonecta* differs from those of the other genera of the family in having neither paired lateral (hereafter termed "alae") nor median anterior or posterior ("appendix interna" and "externa") dilatations.

The genus *Notonecta* is chiefly Palaearctic and Nearctic, having its headquarters in the latter region. It extends into South America, and is represented by a single species in Australia (Professor Hungerford tells me he is making this the type of a new subgenus). It is apparently absent from the Oriental part of Asia, and but a single species is found in the Ethiopian region.

The genus (excluding the Australian *N. handlirschi* Kirk.) may be divided into two groups, which I here give as subgenera.

1. (2) Male genital capsule produced ventrally into a cylindrical digitiform appendage.
Female usually with the first pair of gonapophyses elongate, well chitinized, and used for making slits in aquatic plants. Usually larger, more robust species . . . *Notonecta* Linn. s. str. (type *N. glauca* Linn.).

2. (1) Male genital capsule angulate or tuberculate below, but not produced into a digitiform appendage.
Female with first pair of gonapophyses short and weak. Eggs laid on aquatic plants, etc., but not in slits. Usually small or slender species *Paranecta* subg. n. (type *N. lactitans* Kirk.).

Notonecta s. str. includes *glauca* Linn., *furcata* Fab.,* *viridis* Delc., *lutea* Mull., *maculata* Fab., *pallidula* Poiss., and probably some of the other Old World species, and *irrorata* Uhler and *borealis* Bueno and Hussey among the North American. *Paranecta* includes *lactitans* Kirk. from Ethiopian Africa, the remaining New World species, *kiangsis* Kirk. (=*bergrothi* Esaki=*suensoni* Hungfd.) from China, and *triguttata* Motsch from Japan (*vide* Hutchinson, Ent. Month. Mag., Feb. 1928, p. 35).

It will be seen that the single Ethiopian species is more closely allied to those of North America and the Far East than to its nearest geographical allies (*N. maculata* F., *N. furcata meridionalis* Poiss.,

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* Since the above was written Esaki (Ann. Mag. Nat. Hist. (10), ii. p. 65) has corrected the nomenclature of this and the succeeding species to *N. obliqua* Gallén, with subspecies *N. o. obliqua* Gallén and *N. o. meridionalis* Poiss., and *N. marmorea* Fabr., with subspecies *N. m. marmorea* Fabr. (=*mediterranea* Hutch.) and *N. m. viridis* Delc.

N. viridis mediterranea Hutch., and *N. pallidula* Poiss.) in Palaearctic Africa. Not only has the subgenus *Paranecta* a discontinuous distribution itself, but the same phenomenon is shown to a striking degree in the African species *N.* (*P.*) *lactitans*, recorded from the Cape and from parts of West Equatorial Africa, but absent from a large intervening belt. We may conclude that *Paranecta* is the older subgenus, and in particular that *lactitans* is a very ancient species. It is to be noted that the characters of this subgenus are undoubtedly more primitive than those of *Notonecta* s. str.

In an interesting study of the chromosomes of *Notonecta*, Browne (J. Morph., 27, No. I, 1916, p. 119) finds that in *undulata*, *indica*, and *shooteri* the diploid number is 26, the first spermatocyte division showing 14 (the sex chromosomes conjugate late), and the second 13. In *glauca* and *irrorata* the diploid number is 24, the first spermatocyte division showing 13 and the second 12. In *insulata* the meaning of this decrease in number is shown, for here though the second spermatocyte division shows 12, in the first there are either 13 or 14. In those cases where but 13 were clearly indicated the small 14th was "often found attached to the longest chromosome."

We may note that the 26 chromosome forms belong to the primitive subgenus *Paranecta*, while the 24 chromosome species are of the more specialised *Notonecta* s. str.

In *insulata* where the notonectoid type of spermatogenesis seems to be developing, the somatic characters, undoubtedly agreeing with *Paranecta*, show a distinct foreshadowing of the notonectoid type. Thus the gonapophyses of the female are the best developed of those figured by Hungerford (Kansas Sc. Bull., 1919, xi, pl. xxxi) for species of this subgenus, and the male genital capsule is curiously angulate ventrally. Unfortunately no diploid groups which could be counted were found by Browne.

Poisson in *N.* (*N.*) *maculata* (Arch. Zool. Exp. Gen. 66, No. 2, 1927, p. 23) has likewise found 24 chromosomes in diploid groups, conjugating to give 13 in the first spermatocyte division, with 12 in the second. This species differs from its allies in the short weak first gonapophyses, which are not used for making slits in plants.

The occurrence of the short type is also noted below in *Enithares* and *Nychia*, and was found by Hale in *Paranisops*, while the long drilling type occurs in *Anisops* (Hale, *l.c.*), *Plea*, and *Buenoa* (Hungerford, *l.c.*, pl. xxv and p. 173).

The species described below is the sole member of the genus occurring in Ethiopian Africa.

1. *Notonecta lactitans* Kirk.

Notonecta lactitans * Kirkaldy, 1897, Ann. Mag. Nat. Hist. (6), xx. p. 58.
var. *stygica* ,, 1897, Tr. Ent. Soc. Lond., p. 406.

Testaceous, pronotum yellowish-grey ; scutellum, showing through latter posteriorly, black ; legs testaceous.

Slender and subparallel, just over 3 times as long as broad. Width of head and eyes about $2\frac{1}{2}$ times that of the vertex, which is $1\frac{1}{2}$–$1\frac{2}{3}$ times as wide as the pronotum. Notocephalon slightly longitudinally carinate in its posterior half.

Pronotum with anterior angles obtuse, about $1\frac{3}{4}$ or a little more times as broad as long, sides and posterior margin very slightly sinuate ; with an indefinite transverse impression before the middle, slightly longitudinally carinate and somewhat transversely anteriorly.

Scutellum with a sparse golden pubescence, especially laterally, apically impressed in preserved specimens, about $1\frac{1}{4}$ times as long as the pronotum.

Anterior leg with tibia $2\frac{1}{5}$–$2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is $1\frac{1}{4}$–$1\frac{1}{2}$ times as long as the third ; longer claw rather longer than the latter.

Intermediate leg with tibia just under $2\frac{1}{2}$ times the first (1+2) tarsal joint, which is about twice as long as the third or a little more ; longer claw a little longer than the latter, trochanter simple, femur with a single, straight, slightly forwardly directed, subapical spur in both sexes.

Outer lobe of membrane slightly longer than inner.

♂ (=var. *stygica* Kirk.). Elytra black with a very short, sparse, golden pubescence, best developed on the anterior part of the embolio-corial suture ; the outer edge of the clavus and an elongate spot on the inner part of the posterior margin of the corium and the outer margin of the embolium dull yellow ; membrane smoky brown.

Genitalia as figured. (Plate XXVIII, figs. 1, 2, and 3.)

♀ (=type Kirkaldy). Elytral pubescence as in ♂, black with the clavus, except for its internal margin, the posterior part of the embolium and a large area posteriorly on the corium dull yellow, membrane smoky grey brown. First pair of gonapophyses short.

Length : ♂, 10·5–11 mm.
♀, 11–12 mm.

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* One of Kirkaldy's paratypes (Africa, B.M.) was labelled "*lactitans* Burchell," which MS. name Kirkaldy retained. Burchell presumably collected the species in the Western Cape Province.

Cape.

Table Mountain, Hely-Hutchinson Reservoir, 27, xii, 1925 (G.E.P.).

,, bog above Window Gorge, 31, i, 1926 (G.E.P.).

Silver Mine Valley, Cape Penin., 7, v, 1927, (L.M.S.).

Schoesters River Valley, Cape Penin., 23, vii, 1926 (G.E.P.).

Chapmans Peak Road, near Point, Cape Penin., pond, 24, vi, 1926 (G.E.P.).

Klipfontein Road, Cape Flats, pond, *in copula*, 21, vii, 1926 (G.E.H.).

Zeekoe Vlei, Cape Flats, weedy pool near vlei, 24, x, 1926, nymphs and teneral ♂ (L.M.S.).

Frazerdale Vlei, near Mowbray, 7, xi, 1926 (L.M.S.).

Banhoek, near Stellenbosch, c. 3000 ft., 24, i, 1926 (G.E.P.).

Wellington, pond, 324 ft., 15, v, 1927 (L.M.S.).

Great Winterhoek, Tulbagh dist., c. 3800 ft. and c. 4200 ft., iv, 1916 (R. M. Lightfoot, S.A.M.).

Ceres, kloof on west side of Mitchell's Pass, pool near top of Pass and mountains above on west side, 5–7, xii, 1926 (G.E.H.).

Swellendam, pools in streams, Duivelsbosch and above Koloniesbosch, 13–14, xii, 1926 (G.E.H.).

Also recorded from the Cape of Good Hope (Paris Mus.) by Kirkaldy (*l.c.*). Though known from such widely separated localities as Guinea (*type* Kirkaldy), Gaboon (Vienna Mus., Kirkaldy), and the Cape, this species must have a curiously discontinuous distribution, for it appears to be entirely absent from collections made in the northern and eastern parts of South Africa.

Life-history.—The dates given above indicate that in the Cape Peninsula, if not elsewhere, there is a migration from mountain pools in the autumn to low-lying waters on the Cape Flats and elsewhere, in which situations the insects breed, the newly emerged adults then ascending and populating the localities left by their parents. No specimens were found on Table Mountain a few days before the pairs were taken *in copula* on 21, vii, 1926, as recorded above.

The eggs are as yet unknown, but are presumably laid on submerged objects without being embedded, as in the other species of the subgenus (Hungerford, 1917, Kans. Univ. Sc. Bull., xi; Bare, 1926, Ann. Ent. Soc. Am., xix).

The nymphs described below were taken by Miss L. M. Starke in Frazerdale Vlei near Mowbray, on the Cape Flats, on 7, xi, 1927.

Nymphs. L. 4·5 mm. (? 3rd instar).

Head dilated anteriorly between the eyes, internal borders of eyes very slightly divergent, the least distance between them being very little less than the greatest. Pronotum very transverse, about $\frac{3}{4}$ times as long as head, and rather more than $3\frac{1}{2}$ times as wide as long, lateral margins curved, the greatest width being behind the middle, where it is slightly wider than the head (Plate XXIX, fig. 10). Mesonotum $1\frac{1}{8}$ times as long as head. Anterior leg with tibia $1\frac{1}{2}$ times as long as tarsus, the latter being just under twice as long as longer claw. Intermediate leg with tibia $1\frac{1}{2}$ times as long as tarsus, which is just over twice the longer claw. Intermediate femur without a subapical spine.

Length : 6·4 mm. (? 4th instar).

Head dilated anteriorly between eyes, internal borders of eyes slightly more divergent than in the previous specimen, the greatest vertical interocular distance being about $1\frac{1}{5}$ times the least ; the latter has about the same absolute measurements as it has in the adult, *i.e.* the synthlipsis is relatively much wider and the eyes less broad. Pronotum $\frac{7}{8}$ times as long as the head, very transverse and trapeziform, the sides being straight, widest posteriorly where it is about $1\frac{1}{6}$ times as wide as the head, and about $3\frac{1}{4}$ times as wide as long. Mesonotum $1\frac{1}{3}$ times as long as the head.

Anterior leg with tibia about $1\frac{1}{2}$ times as long as tarsus, which is just over twice as long as the longer claw. Intermediate leg with tibia about $1\frac{1}{2}$ times as long as tarsus, which is just over twice as long as the longer claw. Intermediate femur with a short subapical spine.

Length : 8·5 (last instar, ? 5th).

Head more dilated anteriorly than in adult, internal margins of eyes still more divergent than in the preceding, but the least interocular distance, which is contained in the greatest about $1\frac{1}{3}$ times, actually exceeds the width of the adult synthlipsis (Plate XXIX, fig. 11). Pronotum shaped much as in the preceding, $\frac{6}{7}$ times the length of the head, and just over 3 times as wide as long. Mesonotum $1\frac{2}{3}$ times as long as head.

Anterior leg with tibia just under $1\frac{2}{3}$ times as long as tarsus, which is $2\frac{1}{2}$ times as long as the longer claw.

Intermediate femur with a short subapical spine.

The nymphs are dull yellow with maroon-brown eyes. Similar nymphs to those described above, from 5–9 mm. long, were taken on 24, x, 1926, in a weedy pool near Zeekoe Vlei, Cape Flats. A cast last nymphal moult from this locality is 9·3 mm. long, giving the size of the fully grown nymph.

It will be seen that a considerable change in form occurs between the first and second of the stages described above, particularly in the lateral margins of the pronotum and in the appearance of the femoral spine on the intermediate leg. Butler (Biology of the British Hemiptera-Heteroptera, 1923, p. 560) states of these changes in the European members of the typical subgenus : " *Notonecta* has at least five larval instars . . . . in the first three, however, the shape of the head and eyes does not resemble the adult at all, but is more akin to that of *Corixa*. . . ." A very teneral specimen (♂ Zeekoe Vlei, 24, x, 1926) is greyish-yellow, with greenish-grey legs ; a ♀ taken with it is fully coloured, but probably was somewhat soft when taken. The adult coloration would therefore seem to appear quite soon after ecdysis (cf. *Anisops varia*, infra).

Enithares Spin.

Enithares Spinola, 1837, Ess. Hemip., p. 60.
,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 10.
,, Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v. p. 78.
Bothronotus, Fieber, 1851, Rhynchotogr., p. 46.

Robust and more depressed than *Notonecta*. Pronotum very transverse with a fovea in each anterior angle in which the antenna lies.

Wing with Sc well developed and fused apically with Rs ; R running very close to Sc, R_1 obsolete, Rs fused with M in the region where r-m is found in *Notonecta* ; Cu_1 and Cu_2 moderately well marked in the pigmented outer part of the wing, fused marginally, and m-cu represented by a line of slightly darker colour. A_1 fairly well developed, A_2 indicated basally. The wing of *Notonecta* is more primitive in the persistent r-m, but less so in the poor development of the cubitals, which are probably more apparent in *Enithares* owing to its pigmentation (Plate XXVII, fig. 5).

♂. Genital capsule without a digitiform appendix. Parameres symmetrical ; aedeagus chitinous basally, centrally, and apically, somewhat thin walled, with two appendices externae, a sac-like one basally and a more pointed apical one, which forms with the main shaft of the organ a wide apical portion when fully erected, supported with thickened hoops. Jaczewski's figure (*l.c.*) is presumably from a very partially expanded specimen.

♀. First pair of gonapophyses short and weak.

This is a widespread genus in the Old World occurring throughout the Ethiopian and Oriental regions, in the Eastern Palaearctic, and also Australia. In the New World it is known from South America, but is apparently absent from the Nearctic region as it is from the

Western Palaearctic. The following species have been described from Africa :—

sobria Stål, 1855, " Caffraria."
cincta Gerst., 1860, Mombasa.
glauca Bolivar, 1879, Abyssinia.
v-flavum Reuter, 1884, Ashanti.
compacta Gerst., 1892, Zanzibar.
chinai Jacz., 1927, South Africa, Uganda, Sudan.
rhodopis Hutch., 1928, White Nile.

Kirkaldy (*l.c.*) dismisses *compacta* as a synonym of *blandula* Sign, 1860, from Madagascar, and regards *cincta* and *glauca* as not determinable.

Key to South African Species of Enithares Spin.

1. Smaller, 6·5–9 mm.
    a. 6·5–8·5 mm.
        Anterior tibia of ♂ darkened on the lower surface. Pronotal fovea darkened and often with a conspicuous black spot. First anterior tarsal joint about 1½ to twice as long as second. First intermediate tarsal joint 1⅓ times (or less) as long as second . . *sobria* Stål.
    b. 8·5–9 mm.
        Anterior tibia of ♂ not darkened below. Pronotal fovea concolorous with pronotum, pale. First anterior tarsal joint 1½ to twice as long as second. First intermediate tarsal joint 1⅕–1½ times as long as second . . . . *chinai* Jacz.
2. Larger, 11–11·5 mm.
    Pronotal fovea largely blackish or with conspicuous smoky spot. First anterior tarsal joint from a little under 2–2½ times as long as second. First intermediate tarsal joint 1½ to twice as long as second *v-flavum* Reut.

1. *Enithares v-flavum* Reut.

Enithares v-flavum Reuter, 1882, Oefv. Finsk. Vet. Förk., xxv, p. 41.
" " Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 103.

Head and eyes from 2⅖–2¾ times as wide as vertex, which is 2–2⅓ times as wide as the synthlipsis.

Pronotum very sparsely punctured ; foveae in the anterior angles pale greyish to black ; 2½–3 times as wide as long.

Scutellum very finely and sparsely punctured, from nearly 1½ to more than twice as long as the pronotum.

Anterior tibia about twice as long as the tarsus ; first (1+2) tarsal joint 2–2½ times as long as third, which is shorter than the claw.

Intermediate tibia $2\frac{2}{5}$–$2\frac{3}{5}$ as long as the first (1+2) tarsal joint, which is about twice as long as the third or a little less; claw subequal to the latter.

♂ anterior tibia not darkened below.

Genital capsule 1·5–1·7 mm. long, of characteristic form. (Plate XXVIII, figs. 8, 9.)

Length: 11–11·5 mm.

I have some hesitation in referring the specimens on which the description is based to this species, though they agree tolerably well in structural characters with Kirkaldy's description. This author states that the typical form of *v-flavum* has blackish elytra "die gelbliche Hinterhälfte der Clavus und Coriums ausgenommen." In South African material as well as in a very similar series from Blantyre, Nyasaland (Dr. J. E. S. Old, 1910; B.M., 1911–13), two colour forms are recognisable.

a. Predominantly yellowish grey or cinerous, elytra concolorous.

b. Scutellum and metanotum black, the former with two convergent yellow flecks which form a V, incomplete at the apex and rather indefinite in outline, each fleck being dilated centrally or anteriorly; elytra with a black area at the distal end of the corium and base of the membrane.

The pale coloration in the dark form is situated, therefore, at the base and not in the posterior half of the elytra, and I cannot help suspecting some error unless I misunderstand Kirkaldy's phrase. A single ♂ specimen from Angola (B.M. 76–55) appears from its genitalia to belong to the same species as those from Nyasaland and South Africa. It differs, however, in its slightly smaller size, more regularly defined V on the scutellum, and almost uniformly black elytra, only the base and a marginal area being pale. It is possible that this may represent a distinct local race, but it would be unwise to describe it as such till a better knowledge of the variation of the species is achieved.

CAPE.

Debe Nek (stream in forest near Mnqesha), 27, ii, 1926 (G.E.P.). (*a*) ♂ and ♀. (*b*) ♂.

Kentani, Transkei (*a*) 1899 (S.A.M.).

NATAL.

Kranz Kloof (*b*) ii, 1915 (Marley, S.A.M.).

TRANSVAAL.

Witpoortje, Krugersdorp div., 29, ix, 1926 (*a*), and 2, iv, 1927 (*a* and *b*) (G.E.H.).

Haenertsburg, Pietersburg div. (*a*) ix, 1927 (Miss M. E. Blenkiron).

SOUTHERN RHODESIA.

Great Zimbabwe, pool in stream, 6, vii, 1927 (G.E.H.) (*a*, *b*, and intermediates, probably teneral *b*).

This species is recorded also by Kirkaldy from Guinea (Addah, Reuter's *type*), Ashanti, Togoland, Gaboon, Abyssinia, Erythraea, and the Transvaal.

In all the localities for which definite information exists, this species has occurred in the pools and slower running parts of streams. Some large *Enithares* nymphs noted in a backwater of the river at Wittelsbosch in the Humansdorp division of the Eastern Cape Province probably belong here.

2. *Enithares chinai* Jacz.

Enithares chinai, Jaczewski, 1927, Ann. Mag. Nat. Hist. (9), xx, p. 436.

Dirty yellowish-grey, pronotal foveae not darkened, anterior part of scutellum darkened, elytra almost unmarked or with a small dark fleck in the inner angle of the corium along the corio-claval suture, legs testaceous, wings smoky black, scutellum black with an irregular yellow posterior border of varying width, and distal part of corium and cuneus more or less black.

Width of head and eyes $2\frac{1}{4}$–$2\frac{1}{2}$ times that of the vertex, which is about twice as wide as the synthlipsis.

Pronotum very finely and sparsely punctured, with an indefinite and small transverse depression before the central part of the anterior margin. $2\frac{2}{3}$–$2\frac{3}{4}$ times as wide as long.

Scutellum transversely wrinkled posteriorly, $1\frac{1}{2}$ to nearly twice as long as the pronotum.

Anterior tibia $\frac{1}{2}$ or $\frac{2}{3}$ as long again as the tarsus, concolorous in both sexes; first $(1+2)$ tarsal joint $1\frac{1}{2}$ to twice as long as the third, which is shorter than the longer claw.

Intermediate leg with tibia $2\frac{2}{5}$–$2\frac{4}{5}$ as long as the first $(1+2)$ tarsal joint, which is $1\frac{1}{5}$–$1\frac{1}{2}$ times as long as the third; claw slightly shorter than the latter.

♂ anterior tibia not darkened below.

Genital capsule about 1·5 mm. long, of characteristic form (Plate

XXVIII, fig. 4), with the upper margin of the posterior lobe strongly concave.

Length : 8·5–9 mm.

Cape.

♂ and 2 ♀♀, East London, "2nd Creek," 16, ii, 1926 (G.E.P.).

Type and 5 *paratypes*, East London, 1, v, 1925 (Holden *fide* Jaczewski).

Transvaal.

Kaapmuiden, xi, 1918 (S.A.M., R. Tucker).

♂, ♀♀, Limpopo River, Main Drift, near Messina, 1927 (G.E.H.).

Southern Rhodesia.

♀ Khami River, below ruins near Bulawayo, 27, vi, 1927 (G.E.H.).

♀ Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

The only species with which this might be synonymous is *compacta* Gerst., but if Kirkaldy is correct in synonymising that species with *blandula* Sign, it cannot have concolorous pronotal foveae.

Enithares chinai occurs in the backwaters of rivers and streams, and in pools in dry river-beds. Jaczewski records it from Nawandala, Uganda (G. L. R. Hancock), and Tovit, Sudan (T. R. Yardley). It is just possible that the latter record refers to *E. rhodopis* Hutch., an allied species distinguished by the form of the male genital capsule. The undescribed South African species referred to in the description of *rhodopis* (Ann. Mag. Nat. Hist., i, p. 157, 1928) is *chinai*.

3. *Enithares sobria* Stål.

Notonecta sobria Stål, 1855, O.V.A.F., xii, p. 89.
Enithares sobria Stål, 1865, Hemip. Afr., iii, p 191.
,, ,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 106.
,, ,, Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, pp. 78–81.
,, ,, Jaczewski, 1927, Ann. Mag. Nat. Hist. (9), xx, p. 435.

Width of head and eyes $2\frac{3}{10}$–$2\frac{1}{2}$ times that of vertex, which is 2–$2\frac{1}{2}$ times as wide as the synthlipsis.

Pronotum with foveae varying from yellowish-grey with a small smoky spot dorsally to almost uniform smoky black ; about 3 times as wide as long and sparsely punctate.

Scutellum slightly wrinkled posteriorly, from $1\frac{1}{2}$–$2\frac{2}{9}$ times as long as the pronotum.

Anterior leg with tibia just under twice as long as the tarsus, first (1+2) tarsal joint about $1\frac{1}{2}$ to twice as long as the third ; the latter about $\frac{5}{8}$ as long as the longer claw.

Intermediate tibia 2–3 times as long as the first (1+2) tarsal joint, which is slightly longer than the third ; the latter slightly longer than the longer claw.

♂ anterior leg with apical $\frac{2}{3}$ of tibia, dark below. (Plate XXVII, fig. 6.)

Genital capsule about 1·1 mm. long, of characteristic form. (Plate XXVIII, fig. 6.)

Length : ♂, 7·5–8 mm.
♀, 8–8·5 mm.

Kirkaldy gives the dimensions as 7·2–10 mm., probably the specimens before him contained an admixture of *Enithares chinai* Jacz. and allied species.

The coloration of *Enithares sobria* is very variable, typically it is greyish-yellow or greenish, with transparent greyish elytra ; the scutellum whitish-yellow or pale greenish-grey, and with a large black spot on the distal half of the corium and the cuneus. The size of this spot is very variable, and it may be altogether absent. Many of the brighter coloured individuals are beautifully opalescent. A striking rusty variety of the female is described below.

CAPE.

Buffels Bay, Cape Penin., iv, 1926 (G.E.P.).

Alderman's Farm, Firgrove, Cape Flats, dam, 24, v, 1926 (G.E.P.).

Banhoek, near Stellenbosch, 29, xii, 1925 (G.E.P.).

Swellendam Dam, 17, xii, 1927 (G.E.H.).

Knysna, ponds, 21–23, xii, 1927 (G.E.H.).

Assegaibosch, pool in stream, 13, i, 1927 (G.E.H.).

Grahamstown, dam, 6, iii, 1927 (G.E.H.).

Alice, vlei at Native College Farm and Tyumie River, 23, ii, 1926 (G.E.P.).

Debe Nek, Mnqesha River, 2, iii, 1926 (G.E.P.).

Pirie Mission, pool in stream bed, 2, iii, 1926 (G.E.P.).

East London, pool in stream bed, 13, ii, 1926 (G.E.P.).

" Caffraria " (*type* Stål.).

NATAL.

Estcourt, 1897 (B.M., 1926, 40, F. Brown).

TRANSVAAL.

Witpoortje, Krugersdorp dist., 22, iv, 1928 (G.E.H.).
Plat River, Waterberg dist., 6–18, iv, 1906 (C. Swierstra, T.M.).
Nakapan (*sic*=? Makapan), c. 11, Nouahlier (*fide* Kirkaldy, *l.c.*).

SOUTHERN RHODESIA.

Fort Victoria, 5, vii, 1927 (L.M.S.).
Cleveland Dam, near Salisbury, 2, vii, 1927 (G.E.H.).
Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

BECHUANALAND PROTECTORATE.

Swamp of Linyanti River, Sailodelo, south of Kabulabula, 17, vii, 1927 (G.E.H.).

PORTUGUESE EAST AFRICA.

Pool near Lake Marramwe, vi, 1928 (Miss E. L. Stephens).

form *danae* n.

♀. Basal part of corium and inner margin of cuneus ferruginous red, scutellum yellow or greenish with an indefinite antero-median tawny orange patch.

CAPE.

♀, Alice, Tyumie River, 23, ii, 1926 (G.E.P.).
♀, Debe Nek, Mnqesha River, 2, iii, 1926 (G.E.P.).
2 ♀ ♀ (*type* and *paratype*), Blaauwkrantz Valley, pools in stream bed near Kowie Road, 9, iii, 1926 (G.E.P.).

SOUTHERN RHODESIA.

♀ Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

This species appears to occur in a greater variety of habitats than the preceding. It is widely distributed throughout Africa. Kirkaldy records it from Abyssinia and Somaliland, and Jaczewski from Sierra Leone, French Senegal, and Uganda. Dr. F. O. Stohr has sent me this species from Munshiwemba, Ndola, Northern Rhodesia, and I have taken it in the Sindi River, near Livingstone. Form *danae* is apparently limited to the female sex, and occurs sporadically with the type.

Life-history.—Egg unknown, presumably laid on submerged objects, but not inserted in a slit.

Nymphs.—L. 4·5 mm. (probably *E. sobria*, Cleveland Dam, near Salisbury, 3, vii, 1927).

Head greyish-yellow, eyes grey, pro- and meso-thorax yellow, elytral rudiments, metathorax and base of abdomen blackish, remainder of abdomen greyish.

Head with vertex very slightly swollen anteriorly, internal margins of eyes fairly divergent, the vertex being just over $1\frac{1}{2}$ times as wide as the synthlipsis.

Pronotum just over $\frac{1}{2}$ as long as head; lateral margins very slightly concave, sides of prothorax deeply excavated; widest posteriorly where it is rather wider than the head and rather over $4\frac{1}{2}$ times its length. Mesonotum about $1\frac{1}{3}$ times as long as the pronotum.

Anterior leg with tibia just under $1\frac{1}{2}$ times as long as the tarsus, which is just over $1\frac{1}{2}$ times the longer claw.

Intermediate leg with tibia about $1\frac{1}{4}$ times the tarsus, which is about $1\frac{3}{4}$ times the longer claw. Intermediate femur with a short subapical spine.

Length: 6·0 mm. (Grahamstown, 6, iii, 1926; last nymphal instar).

Dirty yellowish-grey, margins of elytral rudiments dark brown. Head with a slight anterior dilatation; vertex $2\frac{1}{3}$ times the synthlipsis. (Plate XXIX, fig. 12.)

Pronotum just over $\frac{1}{2}$ as long as the head and $4\frac{1}{2}$ times as wide as long; prothorax deeply excavated laterally, the lateral margins of the pronotum being somewhat concave, particularly on their anterior part, the general structure being reminiscent of an adult *Nychia.*

Mesonotum just over $1\frac{1}{2}$ times as long as pronotum.

Anterior tibia about $1\frac{5}{6}$ times as long as tarsus, which is nearly twice as long as the longer claw.

Intermediate tibia rather more than $1\frac{1}{3}$ times the tarsus, which is about $2\frac{1}{3}$ times the longer claw. Intermediate femur with a small subapical spine.

The first nymph described may be of the penultimate or antepenultimate nymphal instars, in the latter case the femoral spine of the intermediate leg is acquired earlier than in *Notonecta.*

The nymphs of *Enithares* can be distinguished from those of *Notonecta* by the more transverse pronotum, which is at least 4 times as wide as long, and the relatively longer head which, however, is less swollen anteriorly. The synthlipsis is also relatively narrower than in *Notonecta* nymphs of the same size.

Tribe ANISOPINI.

These insects, distinguished from *Notonectini* by the characters given above, are slender, and for the most part small insects with pale coloration. The genera are separated by Hale (Proc. Linn. Soc. N.S.W., xlix, pt. 4, 1924, p. 462) as follows :—

1. (2) Anterior and intermediate legs short ; posterior femora, tibiae, and tarsi subequal in length. Eyes basally contiguous. *Nychia* Stål.

2. (1) Anterior and intermediate legs long ; posterior femora, tibiae, and tarsi not subequal in length. Eyes rarely basally contiguous.

3. (6) Ventral keel extending to tip of abdomen. Anterior tibiae of male with a stridulatory comb on a basal spur. Ovipositor of female with a pair of elongate subspatulate and strongly chitinised gonapophyses.

4. (5) Anterior tarsi of male single-jointed . *Anisops* Spin.

5. (4) Anterior tarsi of male two-jointed . . *Buenoa* Kirk.

6. (3) Ventral keel not extending on to last abdominal segment. Anterior tibiae of male without stridulatory comb or basal spur. Ovipositor of female not so modified . . . *Paranisops* Hale.

Only *Nychia* and *Anisops* occur in South Africa. The former may always be recognisable by the basally contiguous eyes, a condition known in *Anisops* only in the Oriental *A. breddini* Kirk. *Buenoa* replaces *Anisops* in the New World, while *Paranisops* is a primitive form known only from New South Wales.

Anisops Spin.

Anisops Spinola, 1837, Ess. Hemip., p. 58.
,, Stål., 1865, Hemip. Afr., iii, p. 191.
,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 111.
,, Hale, 1923, Rec. S. Austr., M. ii, p. 400.
,, Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, 2, p. 81.

Slender and usually small insects. Eyes large, but not contiguous posteriorly in any known African species. Anterior and intermediate legs fairly long. Posterior tarsus distinctly shorter than tibia. Wing with Sc fusing apically with Rs, R_1 absent, M meeting Rs, m-cu indicated, Cu_1+Cu_2 indicated by a broad, ill-defined area, A_1 well defined. (Plate XXIX, fig. 9.)

♂ anterior leg with a stridulatory comb at the base of the tibia, and a single-jointed tarsus bearing a pair of stout claws. Genital capsule boat-shaped. Parameres asymmetrical, the right one being a very broad, leaf-like lobe, the left deeply excavated behind and hook-shaped (Jaczewski, *l.c.*). Aedeagus with a basal fairly well chitinised part, a wide middle portion which bears two slightly forwardly directed alae, the right being a little larger than the left, and a well-defined terminal part (*endosoma* of Pruthi, *l.c.*). Jaczewski's figure is probably from a preparation that is imperfectly erected. (Plate XXXIII, figs. 5, 6.)

♀ anterior tibia without comb, tarsus with a vestigial basal and two well-developed distal joints and bearing slender claws. Gonapophyses elongate, strongly chitinised.

The genitalia of the ♂, as Jaczewski has pointed out, are practically useless for the discrimination of species in this genus, which is the more to be regretted in view of the great number of closely allied species involved. The most important characters available are, however, drawn from the ♂ sex, and identification of ♀ specimens is often impossible. The following structures are most useful in characterising species :—

1. The relative proportions of the joints of the anterior leg of the ♂, the stridulatory comb, and the armature of the tibia.

2. A tubercle lying on the face just above the labrum in the ♂. In the majority of species and in the ♀♀ of all, this is a simple and often obsolete eminence. In others it is laterally compressed, flattened, or deeply excavate. The figure shows the excavated crateriform tubercles of *psyche* and *hancocki* (Ann. Mag. Nat. Hist. (10), i, pp. 159 and 163), the compressed tubercle of *jaczewskii*, and the condition in certain other species discussed under *A. sardea.*

3. The relative proportions of head, vertex, and synthlipsis.

4. The form of the third rostral joint of the ♂ (Jaczewski, *l.c.*), which in all species but one has a pair of lateral prongs on which the stridulatory comb is rubbed (Hale, *l.c.*).

The following key has been drawn up to include all the Ethiopian species known to me. This seems the wisest course to adopt in view of the number of species now known from that region.

Key to the Ethiopian Species of Anisops Spin.

1. (2) Posterior tibia over $1\frac{3}{4}$ times the length of the tarsus ; brachypterous, elytra with a large, black, subapical patch (subgenus *Micranisops* n.)
apicalis Stål (S. Rhodesia,
Caprivi Strip, Caffraria, and Central Africa).

2. (1) Posterior tibia less than $1\frac{3}{4}$ times as long as the tarsus ; macropterous, elytra if pigmented not hyaline with a large, black, subapical patch.

3. (4) Third rostral joint of ♂ simple, without backwardly directed prongs (subgenus *Anisopoides* n.) . . . *aglaia* n. sp. (Cape, Transvaal).
4. (3) Third joint of rostrum of ♂ with backwardly directed prongs (subgenus *Anisops* s.s.).
5. (6) Head of ♂ produced anteriorly into a conspicuous cephalic horn *sardea* H.S. (S.W.A., N.W. Cape, N. Transvaal, Natal, and Central Africa).
6. (5) Head of ♂ not so produced.
7. (10) Anterior tarsus of ♂ less than twice as long as the longer claw.
8. (9) Head not more than 4 times as wide as vertex; stridulatory comb of 12–14 elements . . . *poweri* n. sp. (W. Cape, S. Transvaal).
9. (8) Head at least 6 times as wide as vertex; stridulatory comb of more than 20 elements . . . . . *leesoniana* n. sp. (S. Rhodesia).
10. (7) Anterior tarsus of ♂ at least twice as long as the longer claw.
11. (14) Facial tubercle deeply excavate and crateriform.
12. (13) Larger over 7 mm. long . . . . *hancocki* Hutch. (Uganda).
13. (12) Smaller under 6 mm. long *psyche* Hutch. (N. Transvaal, S. Rhodesia and Central Africa).
14. (11) Facial tubercle not excavate.
15. (18) Facial tubercle laterally compressed.
16. (17) Anterior tibia about 1½ times as long as tarsus *adonis* Hutch. (Central Africa).
17. (16) Anterior tibia about twice as long as tarsus *jaczewskii* Hutch. (N. Transvaal, W. Africa).
18. (15) Facial tubercle simple.
19. (20) Posterior margin of pronotum convex or at most flattened *letitia* n. sp. (E. Cape).
20. (19) Posterior margin of pronotum concave centrally.
21. (22) Large, over 9 mm. long *pellucens* Gerst. (S. Rhodesia, Central Africa).
22. (21) Medium sized and small, under 9 mm. long.
23. (24) Elongate, slender, and fusiform; stridulatory comb borne on a ridge which is transversely striated internally *gracilis* n. sp. (throughout S. Africa).
24. (23) Less elongate, stridulatory comb on an unstriated ridge or eminence.
25. (26) Upper edge of anterior tibia of ♂ armed with a row of very stout spinous hairs . . . *debilis* Gerst. (E. Cape, N. Transvaal, S. Rhodesia, P. E. Africa, and Central Africa).
26. (25) Upper edge of anterior tibia of ♂ with at most fine spinous hairs.
27. (28) Stridulatory comb very wide, rectangular, less than twice as long as broad. Deeply pigmented, greater part of scutellum black when fully coloured *ares* Hutch. (Uganda).
28. (27) Stridulatory comb narrower, at least twice as long as broad.
29. (30) Stridulatory comb subparallel sided of about 25 thin lamellae. Larger, 7 mm. or more long. Well pigmented. Scutellum bright orange and black when fully coloured *varia* Fieb. (general throughout S. and Central Africa).
30. (29) Stridulatory comb not subparallel sided, of 12 or fewer thicker lamellae. Smaller species under 7 mm. long. Scutellum less brightly coloured.
31. (32) Elements of comb seen from above elongate dumb-bell shaped (Plate XXXII, fig. 9). Anterior border of clavus crimson *amaryllis* Hutch. (E. Africa).

32. (31) Elements of comb seen from above lamelliform.
33. (38) Comb widest internal to middle.
34. (37) Anterior border of clavus whitish.
35. (36) Comb as in Plate XXXII, fig. 11, little narrowed internally *kampalensis* Hutch. (Uganda).
36. (35) Comb as in Plate XXXII, fig. 10, considerably narrowed internally *eros* Hutch. (Uganda).
37. (34) Anterior border of clavus crimson when fully coloured. Comb as in Plate XXXII, fig. 4*a* . *praetexta* n. sp. (S. Rhodesia, Transvaal).
38. (33) Comb widest external to middle (Plate XXXII, fig. 2*a*) *hypatia* n. sp. (W. Cape).

A. aphrodite Kirk. from West Africa is omitted as it is inadequately described. It is possible that *A. kampalensis* is a synonym of this species.

The natural arrangement of species in this genus, as in any other, presents considerable difficulties. Since there are certain definite trends of evolution to be observed in the genus, many slight resemblances are of more importance in determining affinity than striking, single ones. A rather indefinite group of species, viz. *adonis*, *jaczewskii*, *eros*, *psyche*, *amaryllis*, and *praetexta*, are characterised by small size, slight but characteristic pigmentation (the anterior angles of the scutellum, metanotum, and base of the dorsum abdominis being blackish, the rest of the scutellum tending to yellow or orange), fusiform build with a head very little narrower than the pronotum, fairly wide vertex and synthlipsis, and short anterior claws in the ♂.

It is not unreasonable to assume that these characters are primitive in the genus ; moreover, in two species, *adonis* and *jaczewskii*, the stridulatory comb is of a very primitive type, consisting merely of a row of 7–9 short, very thick, peg-like hairs. Within this group certain alliances are obvious, *adonis* being very close to *jaczewskii*, *praetexta* to *amaryllis*, while *eros* is closer to these latter than to the others.

From a central group of this kind we can easily imagine lines of evolution which have given rise to various isolated species. Intensification of pigment has occurred in *varia* and *ares*, two rather similar species that are probably allied in spite of their very different combs. In the other members of the genus such pigment as is possessed by these more primitive members of the central group tends to be lost. The short claws, general body form, and small size are retained by *hypatia*, while *debilis* is not very far removed from them in its form and coloration. More specialised conditions are found in the isolated species *letitia* and the very elongate fusiform *gracilis*. The two long-clawed species *poweri* and *leesoniana* have probably originated independently; in the former the vertex and synthlipsis are much wider than in the latter, which also has a more specialised comb.

In all these species there is clearly a tendency for the eyes to get larger and closer, the vertex and synthlipsis becoming narrower in consequence. In no African species of *Anisops* is contact actually achieved, but that condition is found in *Nychia* and the Oriental *A. breddini*, as well as in the Neotropical genus *Martarega*.

Starting from a form like *A. psyche* again in the central group, we can see how not only *A. hancocki* has arisen, but the mode of evolution of the cephalic horn of *sardea* and allied Oriental species. Finally, *pellucens* has developed in size alone, in which it rivals certain species of the *Notonectini*, but shows no other specialisations of note, the head with its wide synthlipsis being particularly primitive. The two subgenera *Micranisops* and *Anisopoides* contain each a single small species, and are probably early specialisations of the central group; the latter particularly in many of its characters is little removed from *A. hypatia*, with which it occurs.

The zoogeographical significance of the African species of the genus is discussed on p. 460.

The complete identification of species is usually only possible in the case of ♂♂. To assist in the determination of females of certain South African species the following table may be useful:—

(1) *apicalis* Stål.

Very short, subparallel. L. 4·5–5·0 mm.

Short posterior tarsi; brachypterous elytra, with subapical black spot.

(2) *sardea* H. S.

Subparallel and slender. L. 8·0–8·5 mm. Vertex longitudinally foveate, facial tubercle usually longitudinally impressed.

(3) *pellucens* Gerst.

Subparallel, robust, and known at once by its very large size. L. 10·5 mm.

(4) *letitia* n. sp.

Fusiform, rather robust. L. 8·0–9·0 mm. This species is at once known by the convex or slightly flattened posterior margin of the pronotum, which separates it from all known species.

(5) *gracilis* n. sp.

Very fusiform and slender. L. 7·0–8·0 mm.

(6) *varia* Fieb.

Rather robust. L. 6·5–7·5 mm. When fully mature brightly coloured, with an orange or orange and black scutellum, black metanotum and abdomen, and crimson flecking at the base of the elytra. The Central African *ares* resembles *varia* in these last characters, but has most of or all the pronotum and all the scutellum, save sometimes the anterior angles, black, whereas in *varia* the apex of the latter is always orange or orange-red.

(7) *praetexta.*

Fusiform, with a rather wide head. L. 6·0–6·5 mm. When fully coloured distinguished by the crimson anterior margins of the elytra, but cannot be separated without a ♂ from the Central African *amaryllis*, which also possesses this character.

Fourteen species of *Anisops* are described below as inhabiting Africa south of the Zambesi.

1. *Anisops* (*A.*) *sardea.*

Anisops sardeus	Herrich Schäffer, 1849, Wanz. Ins., ix, Tab. 294, fig. 904.*
Anisops sardea	Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 114.
,, ,,	Hesse, 1925, Ann. S.Afr. Mus., xxiii, p. 137.
,, ,,	Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, 2, p. 83.
Anisops nivea	Spinola, 1837, Ess. Hemip., p. 58 (nec. Fabr., etc.).
Anisops productus	Fieber, 1847, Abh. Böhm. Ges. Wiss. (5) v, p. 16 (*nomen nudum*).
,, ,,	Fieber, 1852, Abh. Böhm. Ges. Wiss. (5), vii, p. 484.
,, ,,	Stål, 1865, Hemip. Afr., iii, p. 191.
Anisops producta	Poisson, 1926, Arch. Zool. Exp. Gen., 65, p. 181.
Anisops natalensis	Stål, 1858, O.V.A.F., xii, p. 89.

Yellowish or creamy white, scutellum and dorsum abdominis tending to orange, apex of the latter and abdomen ventrally black, often with a black line across the base of the scutellum.

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* Mr. W. E. China writes : " There is some doubt as to the validity of Herrich Schäffer's name *sardea*, which was published in October 1849 . . . since the description is not quite in the proper style, and is apparently not binomial, *sardea* being written in ordinary type. The figure is, however, labelled *A. sardeus*, and the description refers to the figure, so that the valid name should be referred to the Tab. 294, fig. 904, and not to p. 41. . . ."

♂. Form subparallel.

Head produced forward in front to form a cephalic horn which, when viewed from above, is about half as long as the notocephalon (from the anterior margin of eyes forward and backward respectively), its sides convergent and bluntly rounded in front, below slightly excavated, with two longitudinal carinae throughout its length and two latero-longitudinal from the eyes forward. (Plate XXX, fig. 7.)

Width, head $\frac{1}{7}$–$\frac{1}{8}$ times less than that of pronotum.

Synthlipsis about $\frac{1}{20}$ the width of the head.

Third rostral joint with long, narrow, divergent prongs (Plate XXX, fig. 9). Pronotum $1\frac{2}{3}$ to twice as long as wide, smooth, with a row of hairs set $\frac{1}{4}$ of its length forward from the bisinuate posterior margin.

Scutellum $1\frac{1}{4}$ to twice as long as pronotum.

Anterior leg with tibia about $1\frac{2}{3}$ times as long as tarsus, which is about $2\frac{1}{3}$ times as long as the longer claw. Tibia rather stout, with about six short spines on its anterior margin, some of which are flattened and spatulate, and one short spine nearer the stridulatory comb. The latter, situated on a short ridge-like tubercle, is of 16–18 narrow plates, broadest at its proximal end and about $\frac{1}{9}$ of the length of the tibia (Plate XXXI, fig. 1). Tarsus with some stout spine-like hairs basally.

Intermediate tibia about twice as long as the first (1+2) tarsal joint, which is about twice as long as the third; claws very thin, almost as long as the latter.

Posterior tibia about $1\frac{1}{2}$ times the length of the tarsus.

♀. Form subparallel, normally about 4 times as long as wide. Head without cephalic horn, vertex about $\frac{1}{4}$ of the width of the head and just over twice to 4 times as wide as the synthlipsis. Facial tubercle slight, but often distinctly impressed longitudinally (Plate XXX, fig. 8). Notocephalon longitudinally foveate anteriorly, vertex very slightly swollen in front of the fovea. Anterior leg with tibia about twice as long as the first (1+2) tarsal joint or a little more, the latter about twice as long as the third or a little less, longer claw about $\frac{2}{3}$ of the latter.

Intermediate leg as in ♂ but with claws shorter.

Length : ♂, 8·5–9·0 mm.
♀, 8·0–8·5 mm.

CAPE.

Klober, Setagoli dist., dam, Jan. 1927 (Miss B. Lamb).

Victoria West, 2 ♀♀, probably *sardea* (Albany Museum).

NATAL.
Durban (Marley, S.A.M.).

TRANSVAAL.
Rietfontein, Boksburg div., large pan, 27, iv, 1928 (G.E.H.).
Brakpan, Boksburg div., small muddy pan, 1 ♀, 6, v, 1928 (G.E.H.).
Brakpan, large pan, 9, vi, 1928 (G.E.H.).
Plat River, Waterberg dist., 6–18, iv, 1905 (C. Swierstra, T.M.).
Limpopo River, Main Drift and Gorge near Messina, pool and backwater, 27–29, v, 1927 (G.E.H.).

SOUTH-WEST AFRICA.
Otjituo, 1 ♂ (S.A.M.).
Onoolonga, 1 ♀ (S.A.M., *vide* Hesse, *l.c.*).
Kuisib region (Stål, *l.c.*).
Also recorded from South-West Africa by Seiner (*vide* Hesse, *l.c.*).

This species has been the subject of an elaborate morphological monograph by Poisson (*l.c.*), to which the reader is referred for further anatomical information. Poisson regards *sardea* as a maritime species, and in his distribution map shows it occupying the coast-line of the greater part of Africa, save the extreme south. I cannot help suspecting that this distribution is largely due to our ignorance of the water bugs of Central Africa, just as the coastal distribution of names in maps of Africa of the early Victorian period bore witness to the then existing knowledge of the interior of that continent. The occurrence of the species near Messina, at least 300 miles from the sea, argues against a maritime distribution.

The cephalic horn, which is shared to a greater or less degree by the males of certain other species, appears to be a development of the dorsal region of the facial tubercle. In the Japanese species *A. genji* Hutch. (Ann. Mag. Nat. Hist. (9), xix, p. 377) the ventral part of the tubercle is hollowed out, forming a broad groove which is carinated in a way very reminiscent of the ventral surface of the horn in *sardea*. A prolongation of the head just above this groove would give a condition as in *sardea*. The condition of *genji*, moreover, seems to be derived from the simple tubercle through the flattened tubercles found in *aldabrana* Dist. and *vitrea* Sign, and the more advanced crateriform state of *psyche* Hutch. All these conditions are shown in the figures of facial tubercles (Plate XXX, figs. 2–5). It is noteworthy that this species is the only one in which the tubercle of the ♀ is in any way impressed. An incompletely developed cephalic horn is found in ♂ nymphs (l. 6·2 mm.) from the Plat River (Plate XXIX, fig. 13). *A. sardea* is found outside the Ethiopian region, in the countries bordering on the Mediterranean, and in the western parts of Asia. Its wide distribution makes its absence in the extreme south of Africa all the more remarkable.

2. *Anisops* (*A.*) *pellucens* Gerst.

Anisops pellucens Gerstaecker, 1873, in C. von der Decken's Reisen in Ost. Afrika, iii (2), p. 424.
Anisops nivea Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 111 (part).
,, ,, Hutchinson, 1928, Ann. Mag. Nat. Hist. (10), i, p. 164.

Yellowish white.

Fusiform, widest about the first quarter of the elytra, *i.e.* before the middle of the insect.

♂ head slightly narrower than pronotum and about 7 times as wide as the vertex, which is just over $1\frac{1}{2}$ times as wide as the synthlipsis. Anterior $\frac{2}{3}$ of the notocephalon, with fovea between two raised areas, the fovea spreading out behind the latter. Facial tubercle simple. Prongs of third rostral joint broad and moderately long. (Plate XXX, fig. 10.)

Pronotum just over $1\frac{1}{2}$ times as wide as long, with a few long pale hairs anteriorly and a row of short hairs set about $\frac{1}{5}$ in from the posterior margin. Posterior margin markedly concave centrally.

Scutellum subequal in length to pronotum.

Anterior leg with tibia just under $\frac{1}{2}$ as long again as tarsus, which is about $3\frac{1}{2}$ times as long as the longer claw. Tibia with four conspicuous bristles on the basal half of its anterior margin and a bristle row set along the anterior part of the inner surface; posterior margin with three elongate hairs basally; stridulatory comb set rather transversely, of about twenty-four plates arranged regularly and compactly, slightly widened just distal to its centre. (Plate XXXI, fig. 2.)

Intermediate leg with tibia about $2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is about $1\frac{1}{2}$ times the third; longer claw just over $\frac{1}{2}$ the latter.

♀ head about $\frac{1}{6}$ narrower than the pronotum and about 6 times as wide as the vertex, which is just over $1\frac{1}{2}$ times the synthlipsis. (Plate XXIX, fig. 2.)

Scutellum slightly shorter than the pronotum.

Anterior leg with tibia rather over twice the first (1+2) tarsal joint, which is from just over $1\frac{1}{2}$ times to twice the third; claw rather shorter than the latter.

Intermediate leg with tibia about 2½ times the first (1+2) tarsal joint, which is about 1⅓ times the third or less ; claw just under ½ the latter

Length : ♂, 10 mm.
♀, 10·5 mm.

Southern Rhodesia.

1 ♂, 3 ♀♀, Ngamo, near Gwaai, July 1927 (Miss E. L. Stephens).

A. pellucens Gerst., described from Mombasa, was placed by Kirkaldy as a synonym of *nivea* Fabr. Since it is almost certain that the latter species must be dismembered and many of its synonyms revived, I have thought best to refer these specimens to *pellucens*, with which they appear conspecific.

My single Asiatic example of *nivea*, from India, is clearly a very different insect, but as it is unfortunately a ♀ no diagnostic characters can be made out ; its length is but 9 mm.

3. *Anisops* (*A.*) *letitia* n. sp.

Yellowish-white, with apical part of dorsum abdominis and venter abdominis dark.

Fusiform, less than 4 times as long as wide, broadest before the middle, at about the first fourth of the elytra ; pronotum narrower than the greatest width of the body, but slightly wider than that of the head and eyes.

Head and eyes large ; notocephalon with a longitudinal depression between two slightly swollen areas along its anterior half, not reaching vertex and spreading out posteriorly before another indefinite raised area. Facial tubercle well marked and often impressed at the sides. Vertex about ¼ as wide as head and eyes and 2½–3½ times as wide as the synthlipsis. Pronotum smooth with a few pale hairs, less than twice as wide as long, longer than the scutellum in some specimens (type) shorter in others, carinated posteriorly, the carina not reaching the posterior margin and variably produced anteriorly ; posterior margin convex, or at most slightly flattened, not sinuate or emarginate. (Plate XXIX, fig. 3.)

Scutellum fairly rugosely punctured.

♂. Third joint of rostrum with short prongs. (Plate XXX, fig. 11.)

Anterior tibia just over ½ as long again as the tarsus, which is about 2½ times as long as the longer claw. Tibia rather flattened, anterior margin with three spinous hairs basally, posterior margin with two of its basal hairs elongate.

Stridulatory comb very small, about $\frac{1}{20}$ of length of tibia, subparallel sided, of about sixteen lamellae. Tarsus with a spinous hair and a few very small peg-like hairs basally. (Plate XXXI, fig. 3.)

Intermediate tibia just under $2\frac{1}{3}$ times as long as the first (1+2) tarsal joint, which is about $1\frac{1}{4}$–$1\frac{1}{2}$ times as long as the third; the latter about twice as long as the longer claw.

Posterior tibia $1\frac{1}{3}$ times as long as the tarsus.

♀. Eyes slightly less prominent than in the ♂.

Anterior tibia shorter than in ♂, nearly $2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is about $\frac{1}{2}$ as long again as the second longer claw, rather over $\frac{1}{2}$ as long as the latter.

Intermediate tibia just over twice as long as the first (1+2) tarsal joint, which is just under $1\frac{1}{4}$ times as long as the third, the latter being about $2\frac{3}{5}$ as long as the longer claw.

Posterior tibia about $1\frac{1}{3}$ times as long as the tarsus.

Length: 8–9 mm.

CAPE.

Howieson's Poort, near Grahamstown, pool in stream bed, at bottom, 13, iii, 1926, 5 ♀ ♀, 2 ♂ ♂, all slightly teneral (G.E.P.).

This very distinct species may be recognised at once by the convex or straight posterior border to the elytra and the small stridulatory comb. It is evidently very local.

4. *Anisops* (*A.*) *gracilis* n. sp.

Pearly or creamy white, eyes grey or brown, apex of dorsum abdominis darkened, often with a dorsal orange spot in the darkened area.

Legs pale, anterior and middle femora darkened at the base. Fusiform, widest between the first third and middle of the elytra (*i.e.* about the middle of the body), generally more than 4 times longer than wide. Narrowed very slightly from the middle to the pronotum, which at its widest is about $\frac{1}{10}$ or less wider than the head.

Notocephalon very slightly and evenly rounded between the eyes, with little or no indication of a central longitudinal depression; facial tubercle moderately developed.

Vertex about $\frac{1}{5}$ as wide as the head and eyes at their widest and from 3–5 times as wide as the synthlipsis.

Pronotum with an irregular transverse row of long pale hairs about $\frac{1}{4}$ of its length from the posterior margin; about $1\frac{5}{6}$ times as wide as long, posterior margin slightly bisinuate.

Scutellum $1\frac{1}{2}$ times as long as the pronotum, or a little more.

♂. Third rostral joint with short, thick, somewhat curved prongs. (Plate XXX, fig. 12.)

Anterior tibia about $1\frac{3}{4}$ times as long as the tarsus, which is about twice as long as the longer claw. Tibia somewhat flattened, inner margin with a thick spine-like hair apically and three short peg-like hairs along the shaft, outer margin with four to five long hairs basally.

Stridulatory comb of about twelve narrow lamellae, situated on a prominence which is produced forward into a triangular ridge with transverse striations on its inner side. (Plate XXXI, fig. 4.)

Intermediate tibia a little more than twice as long as the first (1+2) tarsal joint; third tarsal joint $\frac{1}{2}$ or $\frac{2}{3}$ as long as the first and about twice or a little more as long as the longer claw.

♀. Anterior tibia twice as long as the first (1+2) tarsal joint, which is about $1\frac{3}{4}$ times as long as the third; claw about $\frac{3}{4}$ as long as latter. (Allotype 66 : 32 : 19 : 15.) Intermediate leg much as in male.

Length: 7·0–8·0 mm.

CAPE.

Durbanville, Cape Flats, dam, 1 ♀, 30, iv, 1927 (L.M.S.).

Wellington, ponds, 15, v, 1927; 15, v, 1927 (L.M.S.).

Swellendam, dams and pond, 12, xii, 1926 (G.E.H.).

Oudtshoorn, dam, 28, xii, 1926 (G.E.H.).

George, dam, 26, xii, 1926, single dead specimen (L.M.S.).

Knysna, pond at Concordia, 23, xii, 1926 (G.E.H.).

Assegaibosch, pool in stream behind hotel, 12, i, 1926 (G.E.P.).

Grahamstown, College House, dam, 6, iii, 1926 (G.E.P.).

Alice, vlei at S.A. Native College Farm, 23, ii, 1926; very common (types) (G.E.P.).

Pirie Mission, pool in stream bed, 3, iii, 1926 (G.E.P.).

King Williamstown, backwater of Buffalo River, 12, ii, 1926 (G.E.P.).

East London, pool in stream bed below Native Location, 13, ii, 1926 (G.E.P.).

East London, larger pond in park, 15, ii, 1926 (G.E.P.).

East London (Lightfoot, S.A.M.).

TRANSVAAL.

Barberspan, 6, iv, 1926 (G.E.H.).

Potchefstroom, 25, iii, 1928 (G.E.H.).

Florida, lake, 12, ii, 1927 (G.E.H.)

Yokskei River, dam near Johannesburg-Pretoria Road, 27, ii, 1927 (G.E.H.).

Birchleigh, dam, 28, iv, 1928 (G.E.H.).

Louis Trichardt, dam, 24, v, 1927 (G.E.H.).

Limpopo River, Main Drift and Gorge near Messina, 27–29, v, 1927 (G.E.H.).

SOUTHERN RHODESIA.

Khami River below ruins, near Bulawayo, 27, vi, 1927 (G.E.H.).

Cleveland Dam near Salisbury, 2, vii, 1927 (G.E.H.).

Banza Halt, Fort Victoria-Gwelo Railway, 5, vii, 1927 (G.E.H.).

LIFE-HISTORY.*

Nymph 6·2 mm. (last nymphal instar, presumably 5th); Alice, 23, ii, 1926 (G.E.P.).

Head slightly narrower than pronotum, just over 4 times as wide as the vertex, which is 3 times the width of the synthlipsis.

Pronotum $2\frac{1}{2}$ times as wide as long and $\frac{5}{6}$ times as long as the mesothorax, lateral margins convex, posterior margins slightly and evenly concave, sides of prothorax deeply excavated below, save in the extreme posterior region. (Plate XXIX, fig. 14.)

Anterior leg with tibia $1\frac{1}{3}$ times as long as tarsus, which is almost $4\frac{1}{2}$ times as long as claws.

Intermediate leg with tibia $1\frac{1}{4}$ times as long as tarsus, which is just over $5\frac{1}{2}$ times as long as claws.

Posterior tibia just under $1\frac{1}{4}$ times as long as tarsus.

The nymphs of *Anisops* can be distinguished from those of *Nychia* by the posterior tarsi, which are distinctly shorter than the tibiae. It is unlikely that any means of distinguishing the species of the nymphs of this genus could be elaborated. The ♂ nymph of *sardea*, however, shows a partially developed cephalic horn. The full-grown nymph of *pellucens* could presumably be identified by its large size. It would be interesting to know to what extent the nymphs of *A.* (*Micranisops*) *apicalis* show the characteristic shortness of the posterior tarsi.

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* The life-history of an Australian species, *A. hyperion* Kirk., has been studied in detail by Hale (Rec. S. Aust. Mus., vol. ii, p. 405, 1923). Five nymphal instars occur.

5. *Anisops* (*A.*) *poweri* n. sp.

Ivory white, dorsum abdominis grey, apically grey with traces of an orange spot.

Fusiform, widest across the first anterior fifth of the elytra, *i.e.* in front of the middle of the body. Pronotum $\frac{1}{6}$–$\frac{1}{7}$ wider than head and eyes.

♂ about 4 times as long as broad.

Vertex a little over $\frac{1}{4}$ of the breadth of the head and 3–$4\frac{1}{2}$ times as wide as synthlipsis.

Notocephalon with a slight fovea between two low carinae ; these fuse more or less in front and are faintly indicated running down the face to form the prominent facial tubercle, which shows traces of a longitudinal impression. Third rostral joint with moderately long divergent prongs. (Plate XXX, fig. 13.)

Pronotum $1\frac{1}{2}$–$1\frac{2}{3}$ times as wide as long, with irregularly placed hairs near the posterior margin. Scutellum variable, almost as long as, or longer than, the pronotum.

Anterior tibia about twice as long as, or a little longer than, the tarsus ; longer claw $\frac{2}{3}$–$\frac{6}{7}$ times as long as the latter ; anterior margin of tibia with a few thickened spinous hairs basally, posterior margin with two basal hairs elongated ; comb of twelve to fourteen lamellae ; anterior margin almost straight, posterior widely convex, so that the comb is narrowed at either end ; claws slightly curved. (Plate XXXI, figs. 6, 6*a*.)

Intermediate tibia a little more than twice as long as the first (1+2) tarsal joint, which is a little less than twice as long as the third, the latter being about $\frac{1}{6}$ longer than the claws.

Posterior tibia about $1\frac{1}{5}$ times as long as the tarsus.

♀ about $3\frac{1}{2}$ times as long as broad.

Width of head $3\frac{1}{3}$–$3\frac{2}{3}$ that of the vertex, which is 3–4 times the synthlipsis ; facial tubercle present but not foveate. Head and pronotum slightly shorter and broader than in male, the latter $1\frac{6}{7}$–$2\frac{1}{10}$ times as wide as long

Scutellum variable, from rather shorter than to $1\frac{1}{4}$ times as long as the pronotum.

Anterior tibia $1\frac{1}{2}$ times as long as the tarsus ; proximal joints of latter about $1\frac{2}{3}$ times as long as the distal, which is a little longer than the claws.

Intermediate leg with tibia longer and third tarsal joint and claws shorter than in the ♂.

Length : ♂, 6·3–6·8 mm.
♀, 6·3–7·1 mm.

CAPE.

(*Type*, *allotype*, and *paratypes*), Kimberley, 1, vi, 1912 (Power, S.A.M.).

Ceres, pond, one very teneral, 5–6, xii, 1927 (G.E.H.).

Avontuur, duck pond, 6, i, 1927 (G.E.H.).

Buffelsfontein, Wodehouse dist., 29, iv, 1928 (G.E.P.).

ORANGE FREE STATE.

Aliwal North, small dam on north bank of Orange River, Rouxville dist., 5, v, 1928 (G.E.P.).

Knoffelspruit, north bank of Orange River, Rouxville dist., pool in stream, 8, v, 1928 (G.E.P.).

Diep Kloof, north bank of Orange River, Rouxville dist., pool in stream, 9, v, 1928 (G.E.P.).

TRANSVAAL.

Rivonia, near Johannesburg, stream, 10, vi, 1927 (G.E.H.).

Yokskei River, dam on Johannesburg-Pretoria Road, 27, ii, 1927 (G.E.H.).

This species is at once distinguished from all save *leesoniana* by the immense development of the anterior claws of the ♂.

6. *Anisops* (*A.*) *leesoniana* n. sp.

♂. Yellowish white.

Fusiform, widest at about first $\frac{1}{4}$ of the elytra, *i.e.* before the middle of the body.

Head slightly narrower than pronotum, about 7 times as wide as the vertex, which is 3 times as wide as the synthlipsis. Notocephalon smooth, facial tubercle obsolete.

Third joint of rostrum with rather short wide prongs. (Plate XXX, fig. 14.)

Pronotum smooth, just under twice as wide as long; posterior margin markedly concave centrally.

Scutellum just under $\frac{1}{2}$ as long as the tarsus, which is $1\frac{2}{3}$ times as long as the longer claw; anterior margin of tibia with a row of very short bristles basally above the stridulatory comb and several more elongate hairs among very short fine ones distally; stridulatory comb on a prominent eminence, narrow, elongate, slightly narrowed distally, of numerous (23) narrow regularly arranged lamellae; claws practically straight. (Plate XXXI, fig. 7.)

Intermediate leg with tibia just over twice as long as the first

(1+2) tarsal joint, which is just under $\frac{1}{2}$ as long again as the third, the latter about $1\frac{2}{3}$ times as long as the longer claw.

Posterior tibia just over $1\frac{1}{5}$ times as long as tarsus.

Length : 5·8 mm.

SOUTHERN RHODESIA.

1 ♂ (type), Cleveland Dam near Salisbury, 2, vii, 1927 (G.E.H.).

This distinct species resembles *poweri* in the very elongate anterior claws of the ♂ ; they are, however, less curved than in the latter species. The structure of the head is, moreover, very different in the two species. I have much pleasure in naming this species in honour of Mr. H. S. Leeson, to whom I owe opportunities of examining this and other important localities in the Salisbury district.

7. *Anisops* (*A.*) *debilis* Gerst.

Anisops debilis Gerstaecker, 1873, in C. von der Decken's Reisen in Ost-Afrika, iii (2), p. 425.

,, ,, Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, p. 86.

Ivory white, eyes, venter, apex of abdomen, and often an ill-defined pronotal area black. Anterior and intermediate femora with a black longitudinal stripe, middle of abdomen dorsally, base of pronotum and base of scutellum orange in some specimens.

Subparallel between pronotum and middle of elytra.

Head about $\frac{1}{10}$ narrower than the maximum width of the pronotum.

Notocephalon with slight or no traces of a longitudinal depression, vertex $\frac{1}{5}$–$\frac{1}{6}$ of the width of head and eyes.

Pronotum with a few pale hairs posteriorly, usually about twice as wide as long.

Scutellum about $1\frac{1}{2}$ times as long as pronotum, but both are variable.

♂. Vertex 3–4·5 times as wide as synthlipsis. Prongs of third rostral joint fairly long and divergent. (Plate XXX, fig. 15.)

Anterior tibia $1\frac{1}{3}$–$1\frac{2}{3}$ times as long as the tarsus, the latter about $2\frac{1}{2}$ times as long as the longer claw. Posterior margin of tibia with three elongate basal hairs, anterior margin with a row of about six thick spinous hairs, the second from the base being more internal than the others. Comb narrow, slightly curved, of about twenty lamellae, situated on a well-marked eminence. (Plate XXXI, fig. 5.)

Intermediate tibia about twice, or a little more, as long as the first (1+2) tarsal joint, which is about $1\frac{3}{4}$ times as long as the third, the latter $2\frac{2}{3}$ times as long as the longer claw.

Posterior tibia 1¼ times as long as tarsus.

♀ usually larger, with rather shorter eyes.

Vertex 2⅘–4 times as wide as synthlipsis.

Anterior tibia about twice as long as the first (1+2) tarsal joint, which is rather less than twice as long as the third, claw about ¾ as long as the latter.

Intermediate leg much as in ♂.

Length : ♂, 6·5–6·8 mm.
♀, 6·8 mm.

CAPE.

East London, pool in stream bed and pond in park, 13–15, ii, 1926 (G.E.P.).

Pirie Bush, 1 ♂ (A. N. Stenning, B.M., 98, 191).

TRANSVAAL.

Louis Trichardt, dams, 24–26, v, 1926 (G.E.H.).

Limpopo River, "gorge" and Main Drift near Messina, 27--29, v, 1927 (G.E.H.).

SOUTHERN RHODESIA.

Khami River, below ruins, near Bulawayo, 27, vi, 1927 (G.E.H.).

Balla-Balla (Mrs. S. Jones, B.M., 1914, 476).

Great Zimbabwe, 1 ♂, 7, vii, 1927 (G.E.H.).

BECHUANALAND PROTECTORATE.

Kazungula, junction of Zambesi and Linyanti Rivers, 1 ♀, 14, vii, 1927, probably *A. debilis* (G.E.H.).

PORTUGUESE EAST AFRICA.

Magude (C. J. Swierstra, T.M.).

This species is evidently very widespread in Central Africa. I have received a long series from Kampala, Uganda, taken by Mr. G. L. R. Hancock. Jaczewski describes what is clearly an identical insect from Dakar, French Senegal, and it is on his authority that I adopt the name *debilis* Gerst. The original description of *debilis*, based on a single ♀ from Mombasa, is unsatisfactory but contains nothing inconsistent with Jaczewski's identification.

8. *Anisops* (*A.*) *varia* Fieb.

Anisops varius	Fieber, 1852, Abh. Böhm. Ges. Wiss. (5), 7, p. 483.
,, *varia*	Kirkaldy, 1899, Ann. Soc. Ent. Fr., lxvii, p. 106.
,, ,,	Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 119.
,, ,,	Lindberg, 1922, Not. Ent., ii, p. 47.
,, ,,	Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, 1926, p. 90.
,, *perpulcher*	Stål, 1858, Oefr. Vet. Ak. Fork., xx, p. 89.
,, ,,	Stål, 1865, Hemip. Afric., iii, p. 192.
,, ,,	Kirkaldy, 1899, Ann. Soc. Ent. Fr., lxvii, p. 106.
,, ,,	Schumacher, 1913, Jenaische Denkschriften, xvii, p. 83.
,, ,,	Hesse, 1925, Ann. S.Afr. Mus., xxiii, p. 136.
var. *sugillata*	Fieber, 1852, *ibid.* (*varius*).
var. *scutellata*	Fieber, 1852, *ibid.* (*varius*).
var. *kalahariensis*	Schumacher, 1913, *ibid.* (*perpulcher*).
var. *plumbeus*	Schumacher, 1913, *ibid.* (*perpulcher*).

Subparallel or very slightly fusiform, 3–3½ times as long as broad, the ♀ being more robust than the ♂.

Head about $\frac{1}{7}$ narrower than the greatest width of the pronotum. Notocephalon in its central part with a narrow longitudinal fovea, often ill defined, between two longitudinal slightly raised areas passing over the vertex but not reaching the synthlipsis.

Vertex $\frac{1}{5}$–$\frac{2}{9}$ as wide as head and eyes and 2·8–3·7 times as wide as synthlipsis. Facial tubercle moderately developed.

Pronotum 1·5–1·8 times as wide as long ; smooth and shining, with a longitudinal fovea in its central region, variably developed, but certainly present in the living insect and not due to shrinkage *post mortem* ; with a sparse hair row about ¼ of the length of the pronotum from the posterior margin ; the latter slightly but widely concave centrally.

Scutellum smooth and shining, variable in length, sometimes shorter and never more than ½ as long again as pronotum.

♂. Third rostral joint with fairly long divergent prongs. (Plate XXX, fig. 17.)

Anterior tibia 1⅓–1½ times as long as tarsus, which is 3–3½ times as long as the longer claw ; anterior margin of tibia with a row of fine spinous hairs which are longer in the proximal portion; posterior margin with three basal hairs, elongate, stridulatory comb subparallel-sided, more than twice as long as wide, of about twenty or more lamellae, of which the apical ones are the widest. (Plate XXXII, fig. 1.)

Intermediate tibia rather more than twice as long as the first (1+2) tarsal joint, which is 1½ times as long as the third, the latter being rather more than twice as long as the longer claw.

Posterior tibia about 1¼ times as long as the tarsus.

♀ normally slightly longer and more robust than the ♂, with a somewhat shorter head.

Anterior tibia twice as long as the first (1+2) tarsal joint, which is ½ as long again as the third; claw rather more than ½ as long as the latter.

Intermediate leg much as in ♂.

Length: ♂, 6–7·0 mm.
♀, 6·5–7·5 mm.

The above description is based on South African material from the Cape and Transvaal, referred below to *A. varia scutellata* Fieb. This species has been the source of much confusion. Fieber described two varieties of his *A. varius* without distinguishing a type form. Through the kindness of Mr. W. E. China I am able to give a transcription of the descriptions of these two colour forms (Abh. k. Böhm. Ges. Wiss., (v), 7, p. 483, 1852).

" *a sugillata.*

" Pronotum vorn mit rothem Fleck. Schild schwarz, Ende und Rander röthlich. Rückenschienen gelblich, 2–3 am Grunde, schwarz. Schildrand röthlich gelb. Länge, 3⅚ Lin. *Anisops sugillatus* Mus. Berol.

" Aus Afrika, Ambukhol (Ehrenberg).

" *β scutellata.*

" Pronotum gelblichweiss. Schild schwarz, der Rand und Spitze gelblich. Rücken schwarz. Schildrand gelblich. Spitz der Oberlippe geröthet.

" **Schild zuweilen ockergelb.*

" *Anisops scutellatus* Mus. Berol. Länge, 3½ Lin. Aus Asien in der Umgegend des Sinai, von Ehrenberg gesammelt."

The first locality and form must presumably be taken as the type locality, and form respectively, there being nothing in the rest of the description to invalidate such a course.

In 1858 Stål described *A. perpulcher* from " Caffraria."

The description given in the Hemiptera Africana (iii, p. 192) is as follows :

" Anguste oblongus, stramineo-albidus ; scutello pallide rufescente-testaceo ; metanoto, macula transversa segmentorum dorsi abdominis, maculis pectoris ventreque nigris ; thorace impressione longitudinale media, anterius abbreviata, instructo. Long. 7, Lat. 2 mm."

Kirkaldy (Ann. Soc. Ent. Fr., lxviii, p. 106, 1899) states that *perpulcher* Stål is a synonym of *varius* Fieber. The former name has, however, been used for material from South-West Africa in the more recent works of Schumacher and Hesse. The former describes two varieties of the species as new. Dr. A. J. Hesse has very kindly transcribed these descriptions for me, which are abridged and translated below.

var. *kalahariensis.* As *perpulcher* but the red colour lacking. Lobatsi, Oct. 1904 (L. Schultze).

var. *plumbeus.* As *perpulcher* but with head, pronotum, scutellum, and elytra lead-grey. Kamaggas, July 1904 (L. Schultze).

These two varieties may for the present be disregarded, for, as will be shown below, they are almost certainly based on series of teneral specimens.

I have examined a large number of individuals from many African localities and summarise the variation as regards size and colour as follows :

1. Egyptian Sudan. Darfur, El Fasher (B.M.).

Length : 7·5–8·0 mm.

Pronotum in nearly every specimen with a conspicuous red fleck on its anterior margin.

This form, both in its perfect agreement in size and colour as well as in its occurrence in the Sudan, may be referred to the typical form (i.e. *sugillata* Fieb.).

2. Kenya Colony (B.M.).

Length : 6·0–8·0 mm.

Pronotum in at least the larger specimens with a red fleck. Many individuals are teneral, so it is not certain exactly how they vary in colour.

3. Nyasaland. Blantyre (B.M.).

Length : 7·0 mm.

No fleck.

4. Southern Rhodesia (G.E.H.).

Length : 6–8·2 mm.

Three very large ♂ specimens (7·2–8·2 mm.) from the Khami River have the red fleck.

5. Transvaal and Cape Province.

Length : 6·0–7·5 mm.

All fleckless.

It is clear that as we proceed from the Sudan southwards we pass from an area inhabited by a large form with a conspicuous red fleck on the pronotum (typical *varia*=*sugillata* Fieb.) to one inhabited by a smaller fleckless insect (*perpulcher* Stål). In the intermediate region, comprising a large part of Central Africa (*e.g.* Kenya, Southern Rhodesia), large and small, flecked and fleckless individuals occur side by side.

The problem is, however, complicated by the conditions north of the Sudan. From the Sinai region Fieber had specimens (*scutellata*) which were small (3½ lin.=7·3 mm.) and in general correspond with Stål's description of *perpulcher*, though probably slightly teneral. Unfortunately I have not seen any specimens from the Sinai Peninsula, but a single example marked Sidi Jaber (which Mr. China tells me is undoubtedly Sidi Gaber, a suburb of Alexandria) is exceedingly like South African material and very different from the Sudanese series. It seems, therefore, that in the extreme cases we may recognise two subspecies.

A. varia varia Fieber =var. *sugillata* Fieber.

Length : 7·5–8·5 mm.

Red fleck on the anterior margin of the pronotum nearly always well developed and probably always indicated in fully coloured specimens. Sudan.

A. varia scutellata Fieber =*A. perpulcher* Stål.

Length : 6–7·5 mm.

Red fleck always absent.

Sinai Peninsula, Egypt, South Africa.

The intermixture of the two forms to the south is clearly shown in the series from Kenya and Khami ; size and development of the fleck are evidently correlated in such mixed populations, and the latter is apparently caused by a fluid containing dissolved pigment in the living insect.

To the north no material is available to show the intergradation.

It would be interesting to know if the two areas occupied by *scutellata* are entirely discontinuous.

In South Africa alone *A. varia scutellata* shows considerable variability, which is complicated by the very slow development of adult coloration. The white colour of the freshly emerged adult is retained for many days after the last ecdysis, though the chitin is entirely hardened. A white specimen taken at Mowbray, Cape Flats, on 21, i, 1927, and kept by Miss L. M. Starke, did not obtain its full adult coloration till 10, ii, 1927. It is probable that the varieties described by Schumacher were based on series of specimens which, apparently fully mature, had not yet completed the slow changes necessary in the assumption of adult coloration ; *plumbeus* probably represents an early white stage not well preserved ; *kalahariensis* a comparatively late condition. I have examined a number of specimens which would agree exactly with the descriptions, but which are undoubtedly merely teneral.

This slow development of colour has precluded any consideration of geographical variation within South Africa, but it is quite clear that no definite raciation occurs. There is, however, a definite correlation between amount of black, *e.g.* on the scutellum, and sex ; female specimens nearly always having more black pigment than males. The following data from one series may be given as an example as they are all particularly full coloured (Table Mt., 31, i, 1926).

Scutellum orange, 3 ♂ ♂, 1 ♀.
Scutellum orange, black anteriorly, 2 ♂ ♂, 2 ♀ ♀.
Scutellum black with orange border, 12 ♀ ♀.

CAPE.

Table Mountain, pool above Window Gorge, 31, i, 1926 (G.E.P.).
Silvermine Valley, Cape Penin., 7, v, 1927 (L.M.S.).
Constantia Nek, Cape Penin., 15, xi, 1927 (L.M.S.).
Roxana Vlei, Mowbray, Cape Flats (*v. supra*), 21, i, 1927 (L.M.S.).
Crawford Vlei, Cape Flats, 2, i, 1926 (G.E.P.).
Mulders Vlei, Cape Flats, 12, vi, 1927 (L.M.S.).
Durbanville, Cape Flats, 30, vi, 1927 (L.M.S.).
Du Toit's Kloof, 16, iv, 1927 (L.M.S.).
Wolseley, teneral (white), 10, xii, 1926 (G.E.H.).
Matroosberg, 3500 ft., Ceres div., Jan. 1917 (Lightfoot, S.A.M.).
Swellendam, dams, 16–17, xii, 1926 (G.E.H.).
Oudtshoorn-Montagu Pass Road, drift, 24, xi, 1925 (G.E.P.).
Cango Caves, pool in stream bed, 29, xii, 1926 (G.E.H.).

Groenkop, Wilderness, near George, pond, 9, xii, 1926 (G.E.H.).

Concordia, near Knysna, pond, 23, xii, 1926 (G.E.H.).

Prince Albert Road, 1916 (Haughton, S.A.M.).

Kimberley, 1, vi, 1912 (Power, S.A.M.).

Riemvastmak, Gordonia, vii, 1925 (Barnard, S.A.M.).

Kamaggas, Namaqualand (type *plumbeus*), vii, 1904 (Schultze, *fide* Schumacher).

Avontuur, duck pond, 6, i, 1927 (G.E.H.).

Assegaibosch, dam, 13, i, 1927 (G.E.H.).

Wittelsbosch, pool, in boggy streams, teneral (white, legs blackish), 9, i, 1927 (G.E.H.).

Grahamstown, dam, 6, iii, 1926 (G.E.P.).

Blaauwkrantz Valley, 9, iii, 1926 (G.E.P.).

Lushington Valley, Pt. Alfred Road, 11, iii, 1926 (G.E.P.).

Alice, Tyumie River and vlei, 23, ii, 1926 (G.E.P.).

Pirie Mission, pond and pools in stream bed, 3, iii, 1926 (G.E.P.).

East London, pools, 13–14, ii, 1926 (G.E.P.).

Aliwal North, radio baths, 6, v, 1928 (G.E.P.).

Avoca Farm, Witteberg Mountains, Barkley East dist., pool in stream, 3, v, 1928 (G.E.P.).

ORANGE FREE STATE.

Aliwal North, dam on north bank of Orange River, Rouxville dist., 5, v, 1928 (G.E.P.).

Knoffelspruit, Rouxville dist., pool in stream, 8, v, 1928 (G.E.P.).

TRANSVAAL.

Witpoortjie, Krugersdorp dist., pools in stream, 11, xi, 1926 (G.E.H.).

Fontaineblaauw, Klein Yokskei River, 1, viii, 1926 (G.E.H.).

Fount Grove, 27, viii, 1905 (T.M., Swierstra).

Woodbush Villa, iv, 1915 (T.M.).

Louwscreek, iii, 1920 (T.M., G. v. D., and A.R.).

Plat River, Waterberg dist., 6–18, iv, 1905 (T.M., Swierstra).

Wemmer Pan, Johannesburg, 10, v, 1928 (G.E.H.).

Rietfontein Pan, Boksburg dist., 31, iii, 1928, etc. (G.E.H.).

Avenue Pan, Benoni, 6, v, 1928 (G.E.H.).

Brakpan, Small Pan, 6, v, 1928 (G.E.H.).

Blaauwwater Pans, Lake Chrissie, 27, ii, 1928 (G.E.H.).

Acorn Hoek (S.A.M.).

Waterval Boven, pools near river, 15–16, iv, 1927 (G.E.H.).

Louis Trichard, dam, 24, v, 1927 (G.E.H.).

Limpopo River, main drift, near Messina, 28, v, 1927 (G.E.H.).

BECHUANALAND PROTECTORATE.

Lobatsi (type *kalahariensis*), 6, x, 1904 (Schultze, *fide* Schumacher).

Mookane, x, 1904 (Schultze, *fide* Schumacher).

Ku Gudie (between Phitsane and Kooa), i, 1905 (Schultze, *fide* Schumacher, *l.c.*).

SOUTHERN RHODESIA.

Khami River, below ruins near Bulawayo (3 ♂♂ form *varia* ; 3 ♂♂, 1 ♀ form *scutellata* *), 27, vi, 1927 (G.E.H.).

Bulawayo (S.A.M.).

101 Mile Halt, Gwelo-Fort Victoria Railway, 5, vii, 1927 (G.E.H.).

Great Zimbabwe, 7, vii, 1927 (G.E.H.).

Morgenster Mission near Great Zimbabwe, 7, vii, 1927 (G.E.H.).

Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

NATAL.

Ifafa, 26, x, 1926 (C. Ackerman, Natal Museum).

SOUTH-WEST AFRICA.

"Namaqualand, Great Karasberg (Schultze), Chamis, Berseba (Schultze), Damaraland, Otjituo (M. Exp.)," Hesse (*l.c.*, p. 137).

9. *Anisops* (*A.*) *hypatia* n. sp.

Ivory white, dorsum abdominis greyish, apically with indications of a subapical orange spot.

Fusiform, but rather wide anteriorly ; a little less than $3\frac{1}{2}$ times as long as wide.

Greatest width between the first $\frac{1}{5}$ and first $\frac{1}{4}$ of the elytra, *i.e.* in front of the middle of the body.

♂ head as wide as, or a little wider than, the pronotum, 4–5 times as wide as the vertex which is $3\frac{1}{3}$–4 times the synthlipsis. Notocephalon with a very slight longitudinal fovea ; facial tubercle moderately developed. Third rostral joint with long thin prongs. (Plate XXX, fig. 16.)

Pronotum about twice as wide as long, posterior margin concave centrally, with a few hairs about $\frac{1}{5}$ of its length from the latter.

Scutellum $1\frac{1}{10}$–$1\frac{1}{4}$ times as long as pronotum.

Anterior tibia just over $1\frac{1}{3}$ times as long as the tarsus, which is $2\frac{1}{2}$–4 times as long as the longer claw. Tibia with a row of slightly thickened short hairs along its inner margin and three long basal and a row of short hairs along the outer margin, stridulatory comb well developed on a low ridge-like eminence, of about thirteen elements, dilated externo-basally. (Plate XXXII, figs. 2, 2*a*.)

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* There seems no valid reason why the varietal names used to designate subspecies or geographical races in the extreme parts of the range of a species should not be used to indicate the two forms where they are found together in an intervening region.

Intermediate tibia twice or more as long as the first (1+2) tarsal joint, which is $1\frac{1}{5}$–$1\frac{2}{3}$ as long as the third, the latter twice as long as the longer claw.

♀ head slightly narrower than the pronotum, about $4\frac{7}{8}$ times as wide as the vertex, which is about 3 times as wide as the synthlipsis.

Notocephalon with a longitudinal fovea between low carinae more clearly marked than in the ♂.

Anterior tibia rather more than twice as long as the first (1+2) tarsal joint, which is about $1\frac{1}{2}$ times as long as the third, the latter twice as long as the claw, or rather less.

Intermediate leg with tibia twice as long as the first (1+2) tarsal joint, which is $1\frac{1}{2}$ times as long as the third, the latter twice as long as the longer claw.

Length : ♂, 5·2–6·0 mm.
♀, 6·0–6·5 mm.

CAPE.

Kirstenbosch, Cape Penin., 16, ix, 1926 (L.M.S.).

Crawford Vlei, Cape Flats, 26, i, 1926 (G.E.P.).

Aldermans Farm, Fir Grove, Cape Flats, 24, v, 1926 (G.E.P.).

Banhoek Stellenbosch, pond at Bloem Erf., 22, xii, 1925 (G.E.P.).

Brink's Farm, between Wellington and du Toit's Kloof, 15, iv, 1927 (L.M.S.).

George, large dam, 26, xii, 1926 (G.E.H.).

Knysna, duckpond at Veldschoens Drift, 21, xii, 1926 (G.E.H. *types*).

Concordia, near Knysna, pond, 23, xii, 1926 (G.E.H.).

Brackenhill Sta., near Knysna, pond, 22, xii, 1926 (G.E.H.).

Alice, vlei on Native College Farm, 1 ♂, 23, ii, 1926 (G.E.P.).

10. *Anisops* (*A.*) *psyche* Hutch.

Anisops psyche Hutchinson, 1928, Ann. Mag. Nat. Hist. (10), i, p. 159.

Notocephalon and legs greyish-yellow, scutellum dull orange, fading to yellowish posteriorly and with two black spots partially covered by the pronotum just within the anterior angles.

Subfusiform, widest at about the first $\frac{1}{3}$ of the elytra, *i.e.* about the middle of the insect, but very little, if at all, narrower across the posterior part of the pronotum.

♂ pronotum about $\frac{1}{7}$ wider than the head, which is just over 4 times as wide as the vertex, the latter about twice the synthlipsis. Notocephalon with a central longitudinal line of a few punctures. Facial tubercle deeply excavated from below, leaving a pair of oblique ridges bounding the upper margin of a cup-shaped depression, and bent upwards towards the vertex anteriorly. Third rostral joint with moderately long prongs. (Plate XXX, fig. 20.)

Pronotum about twice as wide as long or a little less, smooth, finely punctured, and with pale hairs posteriorly; posterior margin slightly concave centrally. Scutellum about $1\frac{1}{3}$ times as long as pronotum.

Anterior leg with tibia just under $\frac{1}{2}$ as long again as tarsus, which is about 3 times the longer claw, or rather less; anterior margin of tibia with two spinous hairs basally and two widely separated peg-like hairs centrally; posterior margin with three basal hairs elongated; stridulatory comb ovoid, of eleven rather thick lamellae. (Plate XXXII, fig. 3.)

Intermediate leg with tibia as long as the first (1+2) tarsal joint or rather more, the latter $\frac{1}{2}$ as long again as the third, or slightly more, the latter rather under twice the longer claw.

Posterior tibia just under $1\frac{1}{3}$ times the tarsus.

♀ slightly more robust posteriorly than the ♂.

Facial tubercle obsolete.

Anterior leg with tibia rather more than twice as long as the first (1+2) tarsal joint, which is rather under twice the third; longer claw a little shorter than the latter.

Intermediate leg with tibia rather more than twice the first (1+2) tarsal joint, which is twice as long as the third, or slightly more; claw about $\frac{1}{2}$ as long as the latter.

Length: 5·5 mm.

TRANSVAAL.

Louis Trichardt, dam, 1 ♂, 26, v, 1927 (G.E.H.).

SOUTHERN RHODESIA.

Khami River, below ruins, near Bulawayo, 27, vi, 1927 (G.E.H.).
101 Mile Halt, Fort Victoria-Gwelo Railway, 5, vii, 1927 (G.E.H.).
Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

This species was originally described from specimens taken by Mr. G. L. R. Hancock at Kampala, Uganda; Dr. F. O. Stohr has also sent me *A. psyche* from Munshiwemba, Ndola, Northern Rhodesia. It is therefore probably a widespread and common Central African species.

11. *Anisops* (*A.*) *praetexta* n. sp.

Head, pronotum, and scutellum greyish-white; metanotum and dorsum abdominis black; elytra hyaline, anterior margin and posterior part of sutural margin of clavus lined with crimson.

♂ fusiform but little narrowed anteriorly, widest at about the first $\frac{1}{4}$ of the elytra, *i.e.* before the middle of the body. Head about $\frac{1}{11}$ narrower than the pronotum and about 7 times as wide as the vertex, which is 3–$3\frac{1}{2}$ times as wide as the synthlipsis. Facial tubercle slight, simple, notocephalon with a very slight fovea anteriorly. Third joint of rostrum with relatively long divergent prongs, slightly swollen basally. (Plate XXX, fig. 19.)

Pronotum just over twice as wide as long; smooth, with scattered pale hairs at about $\frac{1}{5}$ of its length from the posterior margin, which is concave centrally.

Scutellum about $\frac{1}{2}$ as long again as pronotum or rather less. Anterior leg with tibia about $1\frac{1}{3}$ times as long as tarsus, which is about 3 times as long as the longer claw; anterior margin with a row of six strong spinous hairs with very small spines set between them; posterior margin with three basal hairs elongated; stridulatory comb of twelve lamellae, the distal six transversely elongate, particularly the 8th, 9th, and 10th. (Plate XXXII, figs. 4, 4*a*.)

Intermediate leg with tibia rather over twice as long as the first (1+2) tarsal joint, which is rather under $\frac{1}{2}$ as long as the third, the latter about twice as long as the longer claw.

Posterior tibia $1\frac{1}{4}$–$1\frac{1}{3}$ times as long as tarsus.

♀ head $\frac{1}{8}$–$\frac{1}{9}$ narrower than the pronotum, about 6 times as wide as the vertex, which is 2–$2\frac{1}{2}$ times as wide as the synthlipsis. Facial tubercle slight, simple.

Scutellum about $\frac{1}{2}$ as long again as the pronotum or rather more.

Anterior leg with tibia rather over twice as long as first (1+2) tarsal joint, which is about $\frac{1}{2}$ as long as the third; longer claw rather more than $\frac{1}{2}$ the latter.

Intermediate leg with tibia about twice as long as the first (1+2) tarsal joint, which is about $\frac{1}{2}$ as long again as the third; claw about $\frac{1}{2}$ the latter.

Length: ♂, 5·5–6·0 mm.
♀, 6·0–6·5 mm.

TRANSVAAL.

♂ ♂, ♀ ♀, Louis Trichardt, 24–26, v, 1927 (G.E.H.).

1 ♂, Messina, pool in sandy bed of Limpopo, near Main Drift, 28, v, 1927 (G.E.H.).

SOUTHERN RHODESIA.

♂, ♀ (*type* and *allotype*), Morgenster Mission near Great Zimbabwe, 7, vii, 1927 (G.E.H.).

♀, Great Zimbabwe, 7, vii, 1927 (G,E.H.).

♂, ♀, Khami River, below ruins, near Bulawayo, 27, vi, 1927 (G.E.H.).

This series from Louis Trichardt are all teneral, lacking even the crimson anterior border to the elytra; they are, however, firm and well chitinised, so that probably in this species as in *varia* (*vide supra*) the full coloration takes some days or even weeks to develop.

A. praetexta is clearly very close to *A. amaryllis* from East Africa (Hutchinson, *l.c.*), differing chiefly in the wider comb. From *A. eros* it may be distinguished, as may *amaryllis*, by the comb as well as by the crimson anterior border to the elytra, possessed by both *praetexta* and *amaryllis*. Teneral specimens, such as those from Louis Trichardt, closely resemble *hypatia* externally; in that species, however, the comb is widest antero-basally instead of postero-apically.

12. *Anisops* (*A.*) *jaczewskii* Hutch.

A. jaczewskii Hutchinson, 1928, Ann. Mag. Nat. Hist. (10), i. p. 304.
A. vitrea Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, p. 88 (*nec* Signoret).

Notocephalon dark yellowish-grey, pronotum grey, scutellum tawny orange, paler posteriorly and with two large black spots just within the anterior angles (showing through the posterior part of the pronotum), black; metanotum and abdomen, showing through the hyaline elytra, black. Subfusiform, widest between the first $\frac{1}{4}$ and first $\frac{1}{3}$ of the elytra, *i.e.* before the middle of the body.

♂ head about $\frac{1}{8}$ narrower than pronotum and just $5\frac{1}{2}$ times as wide as the vertex, which is $2\frac{3}{4}$ times as wide as the synthlipsis.

Anterior part of notocephalon with slight traces of a longitudinal groove. Facial tubercle laterally compressed and somewhat ridge-like. Third rostral joint with short, stout, widely divergent prongs. (Plate XXX, fig. 18.)

Pronotum just over twice as wide as long; smooth, posterior margin bisinuate. Scutellum about $\frac{1}{2}$ as long again as pronotum.

Anterior leg with tibia about twice as long as tarsus (27 : 14), which is just over twice as long as the longer claw; anterior margin of tibia with three stout spines, the most distal just beyond the middle, finer ones lie proximal to them and one stout one apically; posterior margin with three basal hairs elongate; stridulatory comb of nine to ten peg-like slightly transverse elements. (Plate XXXII, figs. 5, 8.)

Intermediate leg with tibia twice as long as first (1+2) tarsal joint, or a little more, the latter about $1\frac{1}{3}$ times the third, which is just under twice as long as the longer claw.

Posterior tibia $1\frac{1}{3}$ times as long as the tarsus.

♀ head about $\frac{1}{6}$ narrower than the pronotum and $4\frac{3}{4}$–$5\frac{1}{2}$ times the vertex, which is about $2\frac{1}{2}$ times as wide as the synthlipsis.

Anterior leg with tibia about $2\frac{1}{2}$ times the first (1+2) tarsal joint, which is rather more than $1\frac{1}{2}$ times to rather less than twice the third; claw about $\frac{2}{3}$ of the latter.

Intermediate leg with tibia $2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is about $1\frac{1}{3}$ times the third; claw $\frac{1}{2}$ the latter.

Length: ♂, 5·0 mm.
♀, 5·6 mm.

TRANSVAAL.

Limpopo River, Main Drift, near Messina, pool in sand of flood-bed, under shadow of a rock with *A. sardea* and *A. debilis*, 28–9, v, 1927 (G.E.H.).

A. jaczewskii is exceedingly close to *A. adonis* Hutch., but differs in the shorter anterior tarsus of the ♂, the tibia being about twice as long as that joint in the former species and $1\frac{1}{2}$ times in the latter. In *adonis*, moreover, the synthlipsis is rather wider and the spines are situated on the distal rather than the proximal $\frac{2}{3}$ of the anterior margin of the tibia.

My specimens from the Limpopo, as I have pointed out elsewhere (*l.c.*), are apparently conspecific with a series taken by Jaczewski at Dakar, French Senegal, and referred by him to *vitrea* Sign. So far the species has not been taken in the intervening region, which includes the localities for *adonis* (Nigeria and Uganda).

13. *Anisops* (*Anisopoides*) *aglaia* n. sp.

Yellowish- or greyish-white, apex of abdomen darker, especially in ♀. Scutellum orange basally in some specimens from Grahamstown and the Lake Chrissie area.

♂ fusiform, rather more than 3½ times as long as wide; greatest width between first ¼ and first ⅓ of the elytra (*i.e.* before the middle of the body).

Head about $\frac{1}{10}$ narrower than the pronotum and rather over 4 times as wide as the vertex, which is 3 to just under 4 times as wide as the synthlipsis. Notocephalon with a slight longitudinal fovea, not reaching the vertex or synthlipsis, between two slightly raised longitudinal carinae.

Facial tubercle moderately developed and simple. Third rostral joint simple, without prongs. (Plate XXIX, fig. 4.)

Pronotum about 1¾ times as wide as long, and but little shorter than the scutellum, posterior margin bisinuate.

Anterior tibia 1¼–1½ times as long as the first tarsal joint, which is over 3 times as long as the longer claw. The upper part of the inner surface of the tibia flattened to form a slightly concave elliptical area, bounded below by the ridge which in other species bears the stridulatory comb and covered with minute spine-like spatulate hairs; stridulatory comb within this area of seven to nine peg-like elements. (Plate XXXII, figs. 7, 7*a*.)

Intermediate tibia about twice as long as the first (1+2) tarsal joint, which is just over ½ as long again as the third; the latter just under twice as long as the longer claw (type 38 : 17·5 : 11 : 6).

♀ larger and more parallel-sided than the ♂, with a shorter head and smaller eyes. Head 4 to nearly 5 times as wide as the vertex, which is about 3 times as wide as the synthlipsis.

Anterior tibia about twice as long as the first (1+2) tarsal joint, which is more than 1½ times as long as the third; longer claw ½ as long as the latter or a little more (allotype 37 : 18 : 10 : 6).

Intermediate tibia about twice as long as the first (1+2) tarsal joint, which is almost twice as long as the third; longer claw over 1½ times as long as the latter.

Length: ♂, 6·5 mm.
♀, 7·5 mm.

CAPE.

Wynberg Reservoir, Table Mountain, very abundant, 16, x, 1926 (L.M.S.).

Mowbray, Cape Flats, vlei at Roxana, very abundant (*type, allotype,* and *paratypes*), 21, i, 1927 (G.E.H.).

Crawford Vlei, Cape Flats, 1 ♂ among *A. hypatia*, 26, i, 1926 (G.E.P.).

Alderman's Farm, Firgrove, Cape Flats, 1 ♂ among *A. hypatia,* 24, v, 1926 (G.E.P.).

Stormberg, Albert dist., dam, 28, iv, 1928 (G.E.P.).

Dordrecht, dam 2 miles east of; Wodehouse dist., 30, iv, 1928 (G.E.P.).

Grahamstown, College House Dam, 6, iii, 1926 (G.E.P.).

TRANSVAAL.

Randfontein, dam, 1 ♂, 8, v, 1927 (G.E.H.).

Rietfontein, pans Boksburg dist., large pan, 27, iv, 1928 (G.E.H.).

Lake Chrissie, in *Potamogeton,* in 5–10 ft. of water, 26, ii, 1928 (G.E.H.).

Blaauwwater, pans near Lake Chrissie, 27, ii, 1928 (G.E.H.).

Breyten, Bothasrust pan, 27, ii, 1928 (G.E.H.).

This species is distinguished from all known species of *Anisops* by the simple third rostral joint of the ♂, which lacks the basal extensions so characteristic of this genus and *Buenoa.* Perhaps in correlation with this the form of the anterior tibia of the ♂ is also peculiar, with its small stridulatory comb reminiscent of that of *jaczewskii* and *adonis,* set at the side of a large ovate flattened area. On account of the simple third rostral joint it seems advisable to remove *aglaia* to a separate subgenus *Anisopoides* n. Superficially this insect is exceedingly like *A.* (*A.*) *hypatia.*

14. *Anisops* (*Micranisops*) *apicalis* Stål.

Anisops apicalis Stål, 1855, O.V.A.F., xxii, p. 89.
,, ,, Stål, 1865, Hemip. Afric., p. 192.
,, ,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii.
,, ,, Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, 2, p. 91.

Greyish- or yellowish-white, abdomen in life red latero-ventrally, posterior legs tinged with reddish, elytra hyaline with a large subapical black patch. (Plate XXIX, fig. 5.)

♂ fusiform, short and broad, widest between first $\frac{1}{4}$ and $\frac{1}{3}$ of the elytra, *i.e.* before the middle of the body. Head slightly narrower than the pronotum, 4–6½ times as wide as the vertex, which is 3–3¼ times as wide as the synthlipsis. Facial tubercle very slight. Notocephalon with a longitudinal fovea in its anterior portion, ending in front and behind in a very slight swelling on the vertex. Third rostral joint with rather short prongs. (Plate XXX, fig. 21.)

Pronotum 2¾–3¼ times as wide as long, markedly produced between the eyes anteriorly, smooth with a line of pale hairs in the posterior region; posterior margin almost straight, very slightly concave centrally.

Scutellum about ½ as long again as the pronotum.

Anterior leg with tibia just under 1⅓ times as long as tarsus, which is 2½–4½ times the longer claw. Tibia with three basal hairs on the posterior margin, elongate, and with a row of very short, slightly thickened hairs along the anterior margin; comb subelongate, slightly narrowed proximally, of eleven very well-marked lamellae. Tarsus with four very fine hairs in a row on the proximal ½ of the inner surface. (Plate XXXII, fig. 6.)

Intermediate leg with tibia just over twice as long as the first (1+2) tarsal joint, which is about ½ as long again as the third, the latter twice as long as the longer claw. Posterior tibia nearly twice as long as the tarsus (24 : 13).

Brachypterous, membrane of the elytra very small, wings reduced, reaching to about the level of the centre of the black elytral spot.

♀ larger and more robust than ♂.

Pronotum about 2⅓–2¾ times as broad as long.

Scutellum from slightly longer to 1⅔ times as long as the pronotum.

Anterior leg with tibia about twice as long as first (1+2) tarsal joint, which is ½ as long again as the third, the latter ½ as long again as the longer claw, or a little less.

Intermediate leg with tibia rather under 2½ times as long as the first (1+2) tarsal joint, which is slightly longer than the third; claw rather less than ½ the latter.

Posterior leg as in ♂.

Length : ♂, 4·0 mm.
♀, 4·5–5·0 mm.

SOUTHERN RHODESIA.

Cleveland Dam near Salisbury, 2, vii. 1927 (G.E.H.).
Fort Victoria, 5, vii, 1927 (L.M.S.).

CAPRIVI STRIP.

Kabulabula, vlei near Linyanti River, 16, vii, 1927 (G.E.H.).
" Caffraria " (Stål *type*).

This species is apparently very widely spread in Central Africa, being recorded by Jaczewski from Dakar, French Senegal, while Mr. G. L. R. Hancock has sent me specimens from Kampala, Uganda.

Jaczewski (*l.c.*, p. 93) says, " This species differs so strongly from the other representatives of the genus that it could be even placed with some certainty in a separate subgenus ; the genital armature does not show, however, greater differences." I had written my key placing *apicalis* in a new subgenus *Micranisops* before Dr. Jaczewski's paper came into my hands, and in spite of his diffidence I have adhered to this separation. The genus *Buenoa*, which may stand with good reason, has very similar genitalia to *Anisops*, thus these structures do not offer even generic characters in the *Anisopini*, save in the genus *Nychia*. The short posterior tarsi, the brachypterous wings and elytra, and the black spot on the latter are so unlike what is found in any other species of the genus that I believe this course is entirely justifiable.

Nychia Stål.

Nychia Stål, 1858, Eugenie's Resa, p. 268 (type *limpida*).
,, Stål, 1868, Hemip. Afric., iii, p. 190.
,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 124.
Antipalocoris Scott, 1872, in Marshall, Ent. Month. Mag., viii, p. 244 (type *marshalli*).

Eyes meeting internally along at least $\frac{1}{6}$ of their length, and with two emarginations in their posterior border viewed laterally ; face produced very slightly between the eyes dorsally and slightly depressed between them just above the labrum.

Prothorax widely excavated laterally.

Anterior and intermediate legs short, tarsi trimerous in the ♂, the basal joint minute, apparently monomerous in the ♀, posterior legs long, tarsus hardly shorter than tibia, two-jointed and with a single claw. Anterior tibia and two distal tarsal joints with apical combs of bristles. (Plate XXXII, fig. 13.)

Wing with venation greatly reduced, Sc and R unbranched, almost contiguous, M apparently represented only by a small basal portion, Cu_1 moderately developed basally, Cu_2 well developed, but not chitinised basally, A_1 well developed. (Plate XXIX, fig. 8.)

♂ genital capsule boat-shaped with a small ventral knob, slightly asymmetrical along its dorsal border. Parameres asymmetrical, the right-hand one styliform, the left a simple lobe. Aedeagus well chitinised basally, with a central membranous part which bears two asymmetrical alae basally, simulating long parameres, and sac-like appendix external apically, on the left side of which the apical part of the aedeagus (? endosoma) lies spirally coiled. (Plate XXXIII, figs. 1–4).

♀ gonapophyses feebly chitinised and short.

1. *Nychia limpida* Stål.

Nychia limpida	Stål, 1858, Eugenie's Resa, p. 268.
,, ,,	Horvath, 1918, Ann. Mus. Nat. Hung., p. 143.
Antipalocoris marshalli	Scott, 1872, in Marshall, Ent. Month. Mag., viii, p. 244.
Nychia marshalli	Kirkaldy, 1901, Ann. Mus. Genova, xl, p. 809.
,, ,,	Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 125.
,, ,,	var. *sappho*, Kirkaldy, 1901, Ann. Mus. Genova, xl, p. 809.
,, ,,	var. *atavia*, Hale, 1925, Ark. för Zoologi., 17a, No. 20, p. 17.
? *Nychia infuscata*,	Paiva, 1918, Rec. Ind. Mus., p. 282.

N. limpida limpida (Stål).

White, eyes dark red-brown, pronotum somewhat browner than the rest of the body in some specimens. Notocephalon often with a double row of darker mottlings, or in fluid-preserved specimens reddish-brown.

Greatest breadth of the head and eyes $3\frac{1}{2}$–$3\frac{3}{4}$ times the vertex; eyes meeting across the notocephalon.

Pronotum very transverse, about $3\frac{1}{2}$ times as long as wide, transversely wrinkled, with a few pale hairs posteriorly.

♂. Anterior legs with tibia 2–$2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is about twice as long as the third; longer claw about $\frac{1}{2}$ as long again as the latter.

Intermediate leg with tibia 2–$2\frac{1}{2}$ times as long as the first (1+2) tarsal joint, which is $1\frac{1}{3}$ to twice as long as the third; longer claw about $1\frac{2}{3}$ times as long as the latter.

♀. Anterior legs with tibia about $1\frac{2}{3}$ as long as the monomerous tarsus, which is rather more than $1\frac{1}{2}$ times as long as the longer claw.

Intermediate leg with the tibia $1\frac{2}{3}$ times as long as the monomerous tarsus, which is about $1\frac{1}{3}$ times as long as the longer claw.

Macropterous form.—Scutellum very large, somewhat raised, and in one male specimen with a pair of smoky brown patches just within the anterior angles.

Elytra dirty yellowish-white, with an indefinite line inside the costa, continued almost to the base, and widest at its basal end, and another inside subcosta spreading out basally, smoky.

Apex of elytra, and in one female specimen the corial margin of the clavus, also of this colour.

Brachypterous form.—Pronotum much as in the preceding. Scutellum reduced with concave latero-posterior margins.

Elytra with the corium, clavus, and membrane not distinguishable, with a straight internal edge, not overlapping apically; translucent white with a very narrow smoky band along the costa and a smoky tip. Wings shred-like.

Length : ♂, 5 mm
♀, 6 mm.

Macropterous form.

CAPE.
1 ♂, Swellendam, dam, 16, xii, 1926 (G.E.H.).
2 ♀ ♀, Pirie Mission, stream, 3, iii, 1926 (G.E.P.).
1 ♂, East London, Second Creek, Buffalo River, 17, ii, 1926 (G.E.P.).

TRANSVAAL.
3 ♂ ♂, 3 ♀ ♀, Limpopo River, at gorge near Messina, 27, v, 1927 (G.E.H.).

SOUTHERN RHODESIA.
2 ♂ ♂, Khami River, below ruins near Bulawayo, 27, vii, 1927 (G.E.H.).

Brachypterous form.

CAPE.
Oudtshoorn, dam, 28, xii, 1926 (G.E.H.).
Cango Caves, pond in stream-bed, 29, xii, 1926 (G.E.H.).
Lushington Valley, Kowie Road, 11, iii, 1926 (G.E.P.).
Debe Nek, stream in forest, 27, ii, 1926 (G.E.P.).
East London, pond in park, Second Creek, 15–16, ii, 1926 (G.E.P.).

TRANSVAAL.
Randfontein, dam, 8, v, 1927 (G.E.H.).
Rivonia, near Johannesburg, 5, vi, 1927 (G.E.H.).
Waterval Boven, river, 15–16, iv, 1927 (G.E.H.).
Plat River, Waterberg dist., 6–14, iv, 1905 (C. Swierstra, T.M.).
Louis Trichardt, dam, 26, v, 1927 (G.E.H.).
Limpopo River, at gorge near Messina, 27, v, 1927 (G.E.H.).

SOUTHERN RHODESIA.
Khami River, below ruins near Bulawayo, 27, vi, 1927 (G.E.H.).
Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

NORTHERN RHODESIA.

Maramba River, near Livingstone, 12, vii, 1927 (G.E.H.).

form *sappho* Kirkaldy.

Elytra with a black spot just within the internal margin. (Plate XXIX, fig. 6.)

CAPE.

♀♀, Oudtshoorn, dam, 28, xii, 1926 (G.E.H.).
♀♀, Lushington Valley, Kowie Road, 11, iii, 1926 (G.E.P.).
♀♀, Debe Nek, Mnqesha River, 1–2, iii, 1926 (G.E.P.).
♀♀, Pirie Mission, 3, iii, 1926 (G.E.P.).
♀♀, East London, Second Creek, 16, ii, 1926 (G.E.P.).

TRANSVAAL.

2 ♀♀, Potchefstroom, dam, 25, iii, 1928 (G.E.H.).

SOUTHERN RHODESIA.

♀, Makabusi River, near Salisbury, 3, xii, 1927 (G.E.H.).

Nychia limpida bantu n. subsp.

Macropterous form.—Prothorax behind the eyes, mottling on the scutellum, anterior margin of the clavus, corium save for fine veins, and embolium except the anterior part of the internal margin, greyish-black, membrane in type greyish-black, in paratype milky anteriorly.

Brachypterous form.—Corium with a greyish-black longitudinal band on its outer margin and in one specimen with a band from the base on to the disc of the corium greyish (this band is opaque white in other ♀ specimens of *Nychia* and probably represents an area just outside the clavo-corial suture), embolium greyish-black, anteriorly and internally yellowish.

Macropterous form.

CAPRIVI STRIP.

2 ♀♀ (*type* and *paratype*), Kabulabula, vlei near Linyanti River, 16, vii, 1927 (G.E.H.).

Brachypterous form.

BECHUANALAND PROTECTORATE AND CAPRIVI STRIP.

♀, Kazungula, junction of Linyanti and Zambesi, 14, vii, 1927.
♂, ♀, Linyanti River, four hours above Kasane, 15, vii, 1927.
2 ♀♀ (*paratypes*), Kabulabula, vlei near Linyanti River, 16, vii, 1927 (G.E.H.).

NORTHERN RHODESIA.

1 ♀, Zambesi, between Katombora and Kazungula, 14, vii, 1927 (G.E.H.).

Variation and Distribution of Nychia limpida.

The genus *Nychia* was founded by Stål in 1858 to contain a single species *N. limpida* from China. This species is (*fide* Horvath, *l.c.*, 1918) synonymous with *Antipalocoris marshalli* Scott (=*N. marshalli* Kirk.). *N. limpida* has been recorded under one or other of these specific names from Corsica, Abyssinia, Congo, Ceylon, New Guinea, and China. In 1918 Paiva described a second species, *infuscata*, from the marginal zone of the Inle Lake, Shan States, Burma. No differences in structure are described by which the species can be differentiated, and *infuscata* is probably but a subspecies of *limpida*; its colour characters are discussed below.

The first macropterous specimen of this widespread species was recorded by Kirkaldy in 1901 from New Guinea, a single individual occurring with a series of eighteen brachypterous specimens of his form *sappho*. In 1925 Hale described the macropterous form as var. *atavia*, from a pair taken in the Kimberley district of North-West Australia by Mjöberg. Of the structural characters given to distinguish *atavia* from the type the facial fovea is illusionary, being due to shrinkage in drying and shown by a number of brachypterous specimens in my collection. For the rest, my macropterous specimens agree structurally with his description and figures, save that the inner margin of the embolium runs rather more parallel with the costa than in the latter.

No other macropterous specimens appear to be known, though the data recorded above show that this form is not very rare in South Africa, particularly in the Northern Transvaal and Rhodesia. Form *sappho* was described as above stated from eighteen brachypterous specimens taken in New Guinea, Kirkaldy at the same time recording a single individual among a series of the typical form from Lake Dembel, Abyssinia. Unfortunately the sex of none of the specimens is recorded. A series of eighteen suggests that both sexes were present, but it is possible that the smaller ♂♂ had been rejected as nymphs. All my South African specimens are brachypterous females. While in many localities in the Cape it is exceedingly common, this variety is practically absent from collections made outside that province. Among Transvaal specimens two, the only adults taken, from Potchefstroom belong to it, and so does a single one from Rhodesia, in which the spot is very poorly developed. In the Cape specimens there is considerable variation in the size of the latter ; the specimen figured (Plate XXIX, fig. 6) illustrates its maximum development. The following figures show the relative abundance of type and variety in two localities, where adequate series were taken.

	♂.	♀ type.	♀ *sappho.*
Oudtshoorn, 28, xii, 1926 . .	6	1	5
Lushington Valley, 11, iii, 1926 .	7	9	10

Paiva records a *sappho* form in his description of *N. infuscata.* " In some specimens there is a small black spot near the middle of the inner margin of each elytron."

N. limpida bantu appears to be a local race that has developed in the Upper Zambesi and Linyanti River systems. It may extend south in suitable localities along the eastern edge of the Kalahari, for specimens from Randfontein show a considerable amount of black on the outer part of the corium, and are really intermediates between the *bantu* and typical *limpida.* Rhodesian specimens also show a little darkening in this region in some specimens ; curiously enough this is practically absent in two from the Maramba River near Livingstone. Forty miles further west the black-banded *bantu* occurs.

The macropterous specimens of *bantu* are evidently very similar to *atavia*, the coloration of which is described thus : " Clavus shining transparent, narrowly margined with smoky brown, and with a patch of the same colour at outer anterior angle ; claval suture pale ; corium smoky brown, paler towards posterior margin, and with a shining whitish longitudinal vein arising at the anterior angle, extending for whole length of corium and posteriorly meeting the membranal suture ; embolium streaked with smoky brown, almost as long as the corium ; membrane dull milky white, laterally smoky brown ; suture dark brown." Similarly, brachypterous specimens of *N. l. bantu* are extremely similar in coloration to *infuscata* Paiva, in which the elytra are described as " whitish transparent ; corium white, next to embolium a broad longitudinal band extending the whole length and a short discal one (sometimes almost absent) united with the other at the base, extending to a little before the middle of the corium fuscous ; the latter apically dull white. Embolium yellowish-white, the outer margin dark fuscous." These forms differ from *bantu* in the dark markings being brownish rather than blackish-grey, but I have had some doubt as to the advisability of establishing a new name ; the apparent difference in tint, the geographical discontinuity, and the racial status of *bantu* finally led me to take such a course.

The following is a schematic classification of these forms; it is to be taken as provisional and somewhat speculative.

A. *Macropterous forms.*

1. Corium white with an indefinite smoky line inside its outer margin, and another inside the corio-claval suture.
N. limpida limpida, Africa, etc.
2. Corium chiefly smoky brown.
N. l. infuscata (=*atavia* Hale), Australia.
3. Corium chiefly greyish-black.
N. l. bantu, North-West part of South Africa.

B. *Brachypterous forms.*

1. Corium almost entirely white.
N. l. limpida, Africa, Corsica, China, etc.
2. Corium with a brown marginal and a brown discal stripe.
N. l. infuscata, Burma.
3. Corium with a blackish marginal and, rarely, a greyish discal stripe . . . *N. l. bantu*, North-West part of South Africa.
4. Elytra with a black spot near the middle of the inner margin, otherwise 1 or 2 . . *N. l. limpida* or *l. infuscata*, form *sappho*.

It will be noted that the brachypterous forms are always less pigmented than the macropterous, save that form *sappho* is only known among the former.

Life-history.—From the structure of the female genitalia we may conclude that the eggs are attached to submerged surfaces, but not inserted in the stems of aquatic plants as is the case in *Anisops*.

Nymphs.—L. 3 mm. Backwater of Buffalo River, Kingwilliamstown, 21, ii, 1926 (G.E.P.).

Eyes not contiguous on the notocephalon; width of head and eyes about 4 times the vertex, which is $4\frac{1}{3}$ times as wide as the synthlipsis. Pronotum slightly broader than head and eyes, $3\frac{1}{4}$ times as wide as long; obtusely produced forward between the large eyes, which considerably encroach on the anterior margin on either side. Prothorax deeply excavated laterally. Mesothorax about $1\frac{1}{4}$ times as long as prothorax.

Anterior tibia $1\frac{1}{4}$ times as long as the tarsus, which is $1\frac{3}{8}$ times as long as the longer claw.

Intermediate tibia $1\frac{1}{2}$ times as long as the tarsus, which is $1\frac{1}{3}$ times as long as the longer claw.

Posterior tarsus slightly longer than tibia.

L. 4·8 mm. (♀, last instar), Waterval Boven, 15, iv, 1927 (G.E.H.).

Eyes not contiguous on the notocephalon; width of head and eyes 4 times the vertex, which is 8 times the synthlipsis. Pronotum 3 times as wide as long, somewhat wider than the head; the large eyes encroaching on its anterior margin more than in the previous specimen (Plate XXIX, fig. 15). Mesonotum just over $\frac{1}{2}$ as long again as the pronotum.

Anterior leg with tibia $1\frac{1}{4}$ times as long as the tarsus, which is $1\frac{1}{2}$ times as long as the longer claw.

Intermediate leg with the tibia just under $1\frac{1}{4}$ times as long as the tarsus, which is $1\frac{5}{8}$ times as long as the longer claw.

Posterior tibia and tarsus subequal.

The nymphs of *Nychia*, though not showing the characteristic contiguity of the eyes on the notocephalon so conspicuous in the adult, may always be distinguished from those of *Anisops* by the form of the pronotum, in particular of its anterior margin, and by the posterior tarsi, which are as long as, or longer than, the tibiae. The ratio of the vertex to the synthlipsis is rather variable in mature nymphs. In a second specimen from Waterval Boven (l. 4·2 mm., ? mature ♂ nymph) it is 4 : 1; in one from Potchefstroom, 25, vii, 1928 (l. 4·0 mm.), about 8 : 1; in one from the Lushington Valley (l. 4·8 mm.), 4 : 1.

Subfam. PLEINAE.

A single genus is now included in this subfamily, *Helotrephes* Stål, formerly grouped with *Plea*, having been removed by Esaki and China (Tr. Ent. Soc. Lond., 1928) and placed along with two remarkable new genera, *Idiocoris* and *Paskia* from Lake Tanganyika, in a separate family, the *Helotrephidae.*

Plea Leach.

Plea Leach, 1817, Trans. Linn. Soc., xii, p. 11.
  ,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 126.
  ,, Hale, 1923, Rec. S. Aust. Mus., ii, 3, p. 421.
Ploa Stephens, 1829, Cat. Brit. Ins., ii, p. 354.
Ploea Douglas and Scott, 1876, Cat. Brit. Hemip., p. 61.

Very short, broad, and deep. Head transverse; pronotum subhexagonal, transverse. Pronotum and elytra reticulo-punctate; wings reticulate.

Antennae three-jointed. All femora simple. Anterior and intermediate tarsi with a minute proximal and two longer distal joints ;* posterior tarsi with a minute proximal and two long, subequal, distal joints. Posterior legs not markedly flattened and but moderately more hairy than the other two pairs.

Elytra subtriangular, with clavus and corium alone well defined ; membrane flange-like, that of the right elytron fitting over that of the left, forming a closing mechanism (Hungerford, Kans. Univ. Sci. Bull., xi, Dec. 1919, pl. xxv), while apically the left elytron overlaps the right. Wing dilated apically along the anterior border. All veins colourless ; Sc, Rs, M_{1+2}, and A_1 well chitinised ; R lying just below Sc ; R_1 obsolete ; Rs bent down and then gradually up again, not meeting Sc ; M_{1+2} lying close below Rs, distally bent down and branching ; M_{3+4} apparently indicated near the base of the wing fusing with Cu_1, below which lies the feebly indicated Cu_2 ; A_1 much as in other members of the family ; A_2 obsolete ; no r-m. The homologies of the lower median and cubital region are not clear, but might be investigated in more pigmented specimens than I have at my disposal. (Plate XXXIII, fig. 9.)

♂ genital capsule elongate boat-shaped, with a conspicuous knob at the posterior end of the ventral surface ; anterior part of dorsal border slightly asymmetrical. Parameres twisted and asymmetrical, the right being bent over capsule, the left somewhat spirally twisted away from it. Aedeagus with a pair of asymmetrical alae ; apex directed to the right and bearing a strongly chitinised knob and spine (Plate XXXIII, figs. 13, 14).

♀ gonapophyses elongate and well chitinised.

Plea may always be recognised by its short broad form and small size. The posterior legs, though not such efficiently constructed swimming organs as those of the *Notonectinae*, nevertheless are used in the same way.

The asymmetrical genitalia of the ♂, the three-jointed antennae, the tendency to reduction in the number of tarsal joints in the anterior and intermediate legs, and the simple femora, all indicate a closer alliance with the *Anisopini* than with the *Notonectini*.

The genus *Plea* contains fifteen to twenty very closely allied species, the adequate separation of which is a matter of the greatest difficulty. Kirkaldy (Wien Ent. Zeit., xxiii, p. 126, 1904) is the only author who has attempted to give a key to the genus, but the attempt is most unsatisfactory. After taking off *liturata* Fieb. and the New World species the remaining Old World species are grouped according to whether they have a distinct or indistinct longitudinal stripe on the vertex. Since pale specimens, perhaps passing through a prolonged teneral period, perhaps slightly pigmented varieties, of both *pullula* Stål and *leachi* McGr. and Kirk., species in the "distinct" group, may show no sign of the head stripe, the character is only applicable to deeply pigmented specimens, though undoubtedly useful. The whole genus is in need of a thorough revision, in which the ♂ genitalia would have to be considered, though these organs do not show the striking interspecific differences found in some genera. Two species occur in South Africa which may be separated thus :

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* This statement is incorrect, as Mr. W. E. China has pointed out to me that the number of tarsal joints differs in different species (*vide* a forthcoming paper by China and Esaki).

1. (2) Smaller, not exceeding 2 mm. in length . . *pullula* Stål.
2. (1) Larger, 2·2–2·3 mm. in length . . *piccanina* n. sp.

Plea pullula Stål.

Plea pullula Stål, 1855, Oefv. Vet. Ak. Förk., p. 89.
,, ,, Stål, 1865, Hemip. Afr., iii, p. 192.
,, ,, Kirkaldy, 1904, Wien Ent. Zeit., xxiii, p. 128.

Head dirty yellowish-white, with a tawny or dark brown longitudinal stripe on the vertex, often obsolete or absent in the paler specimens, in the darkest broad, well-defined, extending back about half of the length of the head posteriorly ; punctate, the punctures of the posterior part of the head in the darkest specimens dark brown ; central portion of vertex bearing stripe smooth and slightly raised ; eyes deep violet-brown ; least interocular width of notocephalon a little more than half the greatest width of head and eyes.

Pronotum irregularly reticulo-punctate save for two partially fused areas just inside the anterior margin ; cinereous with a narrowly piceous anterior border and a row of black punctures within it, discal punctures often brown ; or whole pronotum greyish-white ; $1\frac{1}{2}$–$1\frac{2}{3}$ times as wide as long.

Scutellum greyish or yellowish-white, widely and irregularly punctate, the punctures brown in dark specimens ; slightly wider basally than long, and $\frac{2}{3}$–$\frac{3}{4}$ as long as the pronotum.

Elytra reticulo-punctate save for a subcostal line, greyish-white with brown punctures posteriorly varying to cinereous, with basal part of claval margin, apical part of corio-claval suture, most of the posterior part of the corium, and most of the corial punctation dark brown. Elytral angle in profile as figured. (Plate XXXIII, fig. 9.)

Legs testaceous or testaceous brown, apex of tibiae and tarsi slightly darker.

Anterior tibia just over twice as long as tarsus, which is about twice as long as claws.

Intermediate tibia under twice as long as tarsus, which is about twice as long as claws.

Posterior tibia rather over 2½ times as long as the first tarsal joint, which is subequal in length to the second; the latter twice as long as the claws.

♂. Right clasper dilated apically in some specimens. Left clasper broad and somewhat sickle-shaped. (Plate XXXIII, fig. 13.)

Length : 1·5–2·0 mm.

CAPE.

Swellendam, dam, 17, xii, 1926 (G.E.H.).
Knysna, pond at Belvedere, 24, xii, 1926 (G.E.P.).
Alice, vlei, 23, ii, 1926 (G.E.P.).
Kingwilliamstown, backwater of Buffalo River, 21, ii, 1926 (G.E.P.).

TRANSVAAL.

Witpoortje, Krugersdorp div., pools, 12, ix, 1926 (G.E.H.).
Florida, lake, 31, x, 1926 (G.E.H.).
Birchleigh, in *Potamogeton*, in dam, 28, iv, 1928 (G.E.H.).
Brakpan, weeds in pan, 14, iv, 1928 (G.E.H.).
Goedeverwachting near Lake Chrissie, reed pan, 17, v, 1928 (G.E.H.).
Louis Trichardt, dam, 24, v, 1927 (G.E.H.).

This species is easily distinguished from the next by its smaller size. It has, moreover, a somewhat less obtuse elytral angle in profile than have *piccanina* and *leachi* McGr. and Kirk. (*minutissima* auct.), and the punctuation, especially of the scutellum, is more irregular and sparse. Stål (Hemip. Afr., iii, p. 192) says: " *P. pullula* Stål. Long. 2, Lat. 1, mill . . . Patria : Caffraria (Mus. Holm.). *P. minutissimae* maxime affinis minor, minus dense, licet distinctius, punctata."

This brief comparison leads me to suppose that it is the smaller of the two South African species which is to be referred to *pullula*; *piccanina* is subequal in size to *leachi* (i.e. *minutissima*) and quite as densely punctate.

Dark specimens of *pullula* have a thick, well-defined head stripe which confirms my identification, for Kirkaldy places this species along with *leachi*, *hovana* Kirk. from Madagascar, and *brunni* from Australia, in the section of his key containing Old World species with a distinct head stripe. He records *pullula* from Zanzibar, Madagascar, and Mauritius, but in view of the confusion in this genus, too much reliance should not be placed on these records. It is possible that *ugandana* Horv. (Ann. Hist. Nat. Mus. Nat. Hung., xvi, 1918, p. 140) is a very dark form of this species.

Plea piccanina n. sp.

Head greyish-white to pale greyish-yellow with a short, broad, diffuse, tawny stripe extending over the vertex a short way on to both face and notocephalon. Punctate ; central part, at least of tawny stripe, smooth and slightly raised. Face with traces of two very short longitudinal carinae below the stripe and in a line with its edges. Eyes deep violet-brown, narrowest interocular distance half the greatest width of head and eyes. Pronotum reticulo-punctate, except for two partly fused, anterior, lightly rugose areas ; cinereous brown anteriorly, with a row of black punctures just within the anterior border ; punctures of disc grey to black ; darker posteriorly, or whole pronotum whitish-grey ; $1\frac{1}{3}$–$1\frac{2}{3}$ times as wide as long.

Scutellum greyish or yellowish-white varying to brown, with the centre pale ; punctate with an antero-median smooth area ; slightly wider basally than long, and $\frac{2}{3}$–$\frac{3}{4}$ as long as the pronotum.

Elytra reticulo-punctate save a subcostal line ; greyish-white with dark punctures posteriorly, varying to cinereous with blackish punctures, paler at the base of the corium and centrally on the clavus, with brown between the punctuation along the basal part of the corio-claval suture, spreading across the corium to its outer margin, and posteriorly near the internal angle of the latter. Elytral angle in profile as figured. (Plate XXXIII, fig. 7.)

Legs testaceous, brown ; apex of tarsi slightly darkened.

Anterior tibia twice as long as tarsus, which is about $2\frac{1}{2}$ times as long as claws.

Intermediate tibia rather under twice as long as tarsus, which is about $2\frac{1}{2}$ times as long as claws.

Posterior tibia $2\frac{1}{2}$ times as long as the first tarsal joint, which is subequal in length to the second ; claws about half the latter.

♂. Right paramere beak-shaped and twisted, little if at all dilated apically.

Left paramere curved and twisted, but not sickle-shaped. (Plate XXXIII, fig. 12.)

Length : 2·2–2·3 mm.

CAPE.

Table Mountain, Hely Hutchinson Reservoir, 27, xii, 1925 (G.E.H.).
Camps Bay, pool, 29, v, 1927 (L.M.S.).
Princess Vlei, pool, 12, i, 1926 (G.E.P.).
Crawford Vlei, 26, i, 1926 (G.E.P.).
Knysna, pond at Veldschoen's Drift, 21, xii, 1926 (G.E.H.).

TRANSVAAL.

Randfontein, dam, 8, v, 1927 (G.E.H.).
Witpoortje, Krugersdorp div., pool, 12, ix, 1926 (G.E.H.).
Florida, lake, 31, x, 1926 (G.E.H.).
Lake Chrissie, pool in stream-bed at north end, 19, v, 1928 (G.E.H.).
Waterval Boven, river, 16, iv, 1927 (G.E.H.).

This species resembles in size, profile, and general appearance the Western Palaearctic species *P. leachi* McGr. and Kirk. so closely that its specific distinction may perhaps be called in question. The only structural differences apparent are that in the latter the head is very slightly more produced between the eyes anteriorly and that the left paramere is more sickle-shaped, while the right paramere is more dilated anteriorly in *leachi* (Plate XXXIII, fig. 14). The great geographical separation of the two forms finally has led me to consider them as distinct species.

In Kirkaldy's grouping *piccanina* would fall among those Old World species having a short, indistinct, vertical stripe, *leachi* having a distinct one. Many pale (perhaps teneral) specimens of the latter have little or no indication of this marking, and the difference between such individuals and pale specimens of *piccanina* is in this respect quite unappreciable.

2. FAM. CORIXIDAE.

Aquatic Hemiptera modified for swimming with the ventral surface below. Somewhat flattened and slightly convex dorsally. Rostrum very short and hardly distinguishable from the face. Anterior legs with tarsi 1—or rarely 2—segmented, the proximal joint being flattened and fringed with bristles (pala). Intermediate legs long and thin. Posterior legs flattened and fringed with hair.

The *Corixidae* are very specialised bugs, and are at once distinguished by the form of the beak. The abdomen of the male is more or less asymmetrical in all the genera, and usually bears on the 6th tergite a curious, multiple, comb-like organ called the strigil. In the very primitive Australasian genus *Diaprepocoris* this apparatus is compound, being composed of two elements. The males of this family stridulate in various ways. In *Micronecta minutissima* L., a European species, the movements of the abdomen which accompany the chirping sound that the species can produce make it practically certain that the strigil is being used, probably scraping on the edge of the undersurface of the right elytron. In no other genus have we any direct evidence that the strigil is concerned with sound production. In *Corixa panzeri* Fieb. the sound is produced by the rubbing of a roughened area on the anterior femur against the side of the head. The same appears to be true of *Sigara* (*S.*) *germari* Fieb. and *S.* (*S.*) *praeusta* Fieb. In *Cymatia coleoptrata* F. I believe the sound is produced by the pala of one of the anterior legs being drawn across the stridulatory area of the opposite femur. A résumé of all published information on this question will be found in Butler—A Biology of the British Hemiptera Heteroptera (London, Witherby, 1923). No observations of the mechanism of stridulation have been made on African species, but *Micronecta scutellaris* (Stål) and *M. citharistia* n. sp. are known to produce a sound very similar to that of *Micronecta minutissima.*

The ♂ genitalia of the *Corixidae* have been described recently by Pruthi (Tr. Ent. Soc. Lond., 1925, p. 185), Jaczewski (Ann. Zool. Mus. Pol. Hist. Nat., 1924, T. iii, z. 1–2, p. 8), and others, so that a further account is unnecessary. It may be pointed out, however, that in the *Corixinae* the 7th abdominal segment is deeply cleft on the side remote from the strigil, and that in *Micronecta* a portion is cut off on the left-hand side of this tergite and lies as a kind of flap covering the genitalia. This " free portion " varies much in form in the different species and is of some systematic importance.

Enderlein (Kungl. Sven. Vet. Ak. Hand., 1912, xlviii, 3) and later Jaczewski (*l.c.*, p. 3) divide the family into two* subfamilies both of which occur in South Africa. The latter's arrangement is here adopted.

1. (2) Antennae three-jointed. Scutellum exposed. Posterior claw inserted at the apex of the last tarsal joint.

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* In the light of Hale's researches a third should almost certainly be instituted for *Diaprepocoris* Kirk., which differs from the other *Corixidae* in its two-jointed anterior tarsi, the presence of ocelli, the large scutellum, and the peculiar stridulatory apparatus of the ♂.

[Since the above was written this has been done by Lundblad, Ent. Tid., 1928, p. 9. G.E.H. 9, i, 1929.]

♂. Sternite of the 9th abdominal segment truncate posteriorly. Upper clasper not forming a sheath for the aedeagus.

Micronectinae Jacz. (*Sigarinae* End.).

2. (1) Antennae four-jointed. Scutellum almost or completely hidden by pronotum. Posterior claw inserted before the end of the apical joint of the tarsus.

♂. Sternite of the 9th abdominal segment produced posteriorly into a grooved process. Upper clasper (right in South African genera) forming with the latter process a sheath supporting the aedeagus.

Corixinae End.

Subfam. MICRONECTINAE.

These are all small water-bugs arranged in two genera, *Micronecta* Kirk. in the Old World, *Tenagobia* Berg. in the New.

Micronecta Kirk.

Micronecta Kirkaldy, 1897, Entom., p. 260.
,, Hale, 1922, R.S., Aust. M., ii, 2, p. 323.
Sigara Fabricius, 1794, Ent. Syst., iv, p. 59 (part).

Scutellum small, covered by the pronotum only at its anterior margin. Posterior margin of pronotum convex or straight, never roundly emarginate or concave. Strigil present in ♂, on the right-hand side of the 6th abdominal tergite.

In the present paper seventeen species of this genus are recorded, all but two of which appear to be undescribed. Many of the species can only be separated by the genitalia of the ♂, which organs have hitherto only been described in the few species which Jaczewski has examined. The following key aims at the separation at least in the ♂ ♂ of all these forms, but where a sufficient amount of material exists to justify dissection before a detailed examination of external characters is made, it will be found quicker to determine these insects by first mounting the genitalia of a ♂ and comparing them with the figures on Plates XXXIV–XXXVI, after which the description of the species may be consulted. Many species doubtless remain to be discovered in Central Africa.

Key to the South African Species of Micronecta Kirkaldy.

1. (2) Synthlipsis more than ½ as wide as head and eyes
dorothea n. sp. (S. Transvaal).
2. (1) Synthlipsis less than ½ as wide as head and eyes.
3. (26) Macropterous forms.

4. (15) Larger, over 2·5 mm. long.
5. (6) Head and eyes more than 2½ times as wide as synthlipsis *hessei* n. sp. (S.W.A.).
6 (5) Head and eyes not more than 2½ times as wide as synthlipsis.
7. (10) Pronotum sparsely and finely pubescent.
8. (9) Left clasper of ♂ with a smooth terminal flange *scutellaris* Stål (S. Africa).
9. (8) Left clasper of ♂ with a toothed terminal flange *perdita* n. sp. (N. Transvaal).
10. (7) Pronotum not pubescent on disc.
11. (12) Posterior margin of pronotum pubescent *druryana* n. sp. (Upper Zambesi and Linyanti Rivers).
12. (11) Posterior margin of pronotum not pubescent.
13. (14) Pronotum wider than head and eyes . . *winifreda* n. sp. (W. Cape).
14. (13) Pronotum narrower than head and eyes . *gorogaiqua* n. sp. (Cape).
15. (4) Smaller, not exceeding 2·5 mm. long.
16. (23) Outer setigerous angle of free portion of 7th abdominal tergite of ♂ well developed.
17. (18) Pronotum 3·5–4 times as wide as long *monomatapae* n. sp. (S. Rhodesia).
18. (17) Pronotum less than 3·5 times as wide as long.
19. (20) Left clasper of ♂ a regular flattened triangular plate (Plate XXXVI, fig. 2*c*) . . . . . *uvarovi* Jacz. (Natal, S. Rhodesia).
20. (19) Left clasper not as above.
21. (22) Free portion of 7th abdominal tergite of ♂ with a concave posterior border (Plate XXXV, fig. 4*a*) *browni* n. sp. (W. Transvaal, S. Rhodesia, S.W.A.).
22. (21) Free portion of 7th abdominal tergite of ♂ gradually narrowed posteriorly, the inner angle obsolete (Plate XXXV, fig. 7*a*) *bleekiana* n. sp. (Linyanti River, S. Rhodesia, N. Transvaal).
23. (16) Outer setigerous angle of free portion of 7th abdominal tergite of ♂ obsolete or absent.
24. (25) Left clasper of ♂ styliform, membranous apically (Plate XXXVI, fig. 3*b*) *piccanin* n. sp. (S. Africa).
25. (24) Left clasper of ♂ sigmoid, chitinous throughout (Plate XXXVI, fig. 4*b*) *youngiana* n. sp. (E. Transvaal).
26. (3) Brachypterous forms.
27. (34) Outer setigerous angle of free portion of 7th abdominal tergite of ♂ well developed.
28. (31) Smaller species, under 2 mm. long.
29. (30) Left clasper of ♂ short, denticulate and slightly sigmoid apically (Plate XXXV, fig. 5*b*) . *quewalepele* n. sp. (Linyanti River, Caprivi Strip).
30. (29) Left clasper of ♂ sigmoid, not denticulate (Plate XXXV, fig. 6*b*) *simillima* n. sp. (Linyanti River, S. Rhodesia).
31. (28) Larger species, 2·0–2·5 mm. long.
32. (33) Elytra mottled, dark greyish-brown, and stramineous. Left clasper of ♂ styliform, denticulate . . . *butleriana* n. sp. (E. Cape).
33 (32) Elytra not mottled. Left clasper of ♂ auriculate *citharistia* n. sp. (E. Cape, O.F.S., S. Transvaal).
34. (27) Outer setigerous angle of free portion of 7th abdominal tergite of ♂ obsolete or absent . . . . . . *piccanin* n. sp. (S. Africa).

1. *Micronecta scutellaris* (Stål).

Sigara scutellaris Stål, 1858, Oefv. Vet. Ak. Förh., p. 319.
Micronecta signoreti Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, p. 102, *nec* Reut.
,, *thomaseti* Jaczewski, 1927, Ann. Mag. Nat. Hist., (9), xx, p. 443.

Head pale yellow or yellow-brown with a dark or reddish-brown longitudinal stripe not reaching back to the posterior margin and two spots on the vertex nearer the eyes than the centre of the latter, all these markings obsolete in some specimens ; pronotum greyish-brown ; scutellum light greyish-brown ; elytra greyish ; base of clavus greyish ochreous, remainder of clavus with traces of a darker inset border ; corium with very faint confluent longitudinal darker lines ; intermediate leg yellow ; apex of tarsus concolorous or very slightly darkened.

Head subequal in width to pronotum, sometimes slightly narrower, sometimes slightly broader, and from $2\frac{1}{5}$ to nearly $2\frac{1}{2}$ times as wide as the synthlipsis. Pronotum rather shorter than head, about 3 times as wide as long, finely and sparingly pubescent throughout, slightly rugose, posterior border convex.

Scutellum rather more than $\frac{1}{2}$ as long as pronotum.

Macropterous. Line from internal angle of right corium on to membrane slightly sigmoid. Subcostal furrow $\frac{3}{7}$ of length of elytron.

Intermediate leg with tarsus about $\frac{1}{2}$ as long again as claws, which are slightly longer than tibia.

♂. Free portion of the 7th abdominal tergite with a prominent outer setigerous lobe, a well-developed inner lobe, and a concave margin between them. (Plate XXXIV, fig. 1*a*.)

Right clasper with a slender shaft slightly dilated basally. (Plate XXXIV, fig. 1*b*.)

Left clasper flattened, slightly bent, flanged apically, the flange untoothed save for the base of its outer margin. (Plate XXXIV, fig. 1*c*.)

Length : ♂, 3·4–3·8 mm.
♀, 3·7–4·5 mm.

CAPE.

Bergvliet, Cape Flats, 3, i, 1926 (G.E.P.).
Princess Vlei, Cape Flats, 12, ix, 1926 (L.M.S.).
Lakeside Vlei, Cape Flats, 19, i, 1927 (G.E.H.).
Zeekoe Vlei, Cape Flats, 24, iv, 1927 (L.M.S.).

Swellendam, 24, xi, 1925 (G.E.P.).
Oudtshoorn and district, 24, xii, 1926 (G.E.H.).
Brackenhill Sta., Knysna Forest, 22, xii, 1926 (G.E.H.).
Prince Albert Road, 1916 (Haughton, S.A.M.).
Potfontein, 3, iv, 1927 (L.M.S.).
Kimberley, 1, vi, 1912 (Power, S.A.M.).
Grootfontein (Purcell, S.A.M.).
Riemvastmak, Gordonia, vii, 1925 (Barnard, S.A.M.).
Avontuur, 6, i, 1927 (G.E.H.),
Assegaibosch, Humansdorp div., 13, i, 1927 (L.M.S.).
Wittelsbosch, Humansdorp div., 9, i, 1927 (G.E.H.).
Port Elizabeth, Baakens River, 18, iii, 1926 (G.E.P.).
Alice, 23–24, ii, 1926 (G.E.P.).
Debe Nek, 2, iii, 1926 (G.E.P.).
East London, 1915 (Lightfoot, S.A.M.), 13–15, ii, 1926 (G.E.P.).
Stormberg, Albert dist., dam, 28, iv, 1928 (G.E.P.).
Dordrecht, Wodehouse dist., dam 2 miles east of, 30, iv, 1928 (G.E.P.).
Buffelsfontein, Wodehouse dist., 29, iv, 1928 (G.E.P.).
Aliwal North, Radio Baths (*vide infra*, p. 465), 5–6, v, 1928 (G.E.P.).

ORANGE FREE STATE.
Knoffelspruit, Rouxville dist., pool in stream, 8, v, 1928 (G.E.P.).

TRANSVAAL.
Florida, 14, viii, 1926 (G.E.H.).
Wemmer Pan, Johannesburg, 31, vii, 1926 (G.E.H.).
Waterval Boven, 15, iv, 1927 (G.E.H.).

NATAL.
Umhlali, i, 1913 (Barnard, S.A.M.).
Weenen (*M. thomaseti* Jacz.), xi, 1923 to i, 1924 (H. P. Thomaset, *fide* Jaczewski).

SOUTHERN RHODESIA.
Nyombi on Fort Victoria-Gwelo Railway, 5, vii, 1927 (G.E.H.).
101 Mile Halt on Fort Victoria-Gwelo Railway, 5, vii, 1927 (G.E.H.).
? ♀ Matopo Dam, 10, vii, 1927 (G.E.H.).
? ♀ ♀ Zimbabwe, 7, vii, 1927.

SOUTH-WEST AFRICA.
Kuisip River Territory (Stål *type*).

Outside our area I have examined specimens from Zomba (Cameron, 25, iv, 1900) in the University Museum of Zoology, Cambridge, kindly lent me by Dr. Hugh Scott. These Nyasaland *scutellaris* are all rather large (4–4½ mm.), while the Rhodesian series lack the larger specimens found in the Cape in many localities. Jaczewski has recorded this species under the name of *M. thomaseti* from Dakar, French Senegal, so it is probably widely distributed throughout Africa. The specimens recorded from Grootfontein, S.W.A., by Hesse (Ann. S.A.M., xxiii, p. 138) were taken, so Dr. Hesse tells me, at Grootfontein in Cape Province by Purcell, who never collected in South-West Africa. Hesse's other record is described under *M. hessei* n. sp. below.

This species is one of the commonest and most widely distributed water-bugs in South Africa. Like most species of the genus it is found chiefly on the muddy bottom of open shallow water either stagnant or slowly flowing.

This insect is clearly identical with *M. signoreti* Jacz., later redescribed as *M. thomaseti* Jacz. In the earlier paper Jaczewski figures the parameres, which agree with those of the present insect. I have no hesitation in ascribing the latter to *scutellaris* Stål on account of its size and of the three markings on the vertex (vertice saepissime fusco-trilineato . . . Long. 4½ mm.).

2. *Micronecta perdita* n. sp.

Head dirty yellow with three greyish longitudinal stripes, strongest anteriorly on the vertex, fading out posteriorly before reaching the margin, obsolete in some specimens; pronotum dull grey-brown, paler along posterior margin; elytra dull grey-brown; clavus with paler basal border concolorous with scutellum, remainder of clavus with traces of a darker inset border; corium with traces of four darker brown confluent longitudinal lines; intermediate legs pale yellow throughout.

Head very slightly narrower than the pronotum and not more than 2½ times as wide as the synthlipsis. Pronotum ½ as long again as head or longer, more than 2½–2⅔ times as wide as long, with a few faint transverse wrinkles, very finely pubescent, posterior margin convex.

Scutellum ½–⅗ times as long as pronotum. Macropterous; vein from internal angle of right corium on to membrane slightly sigmoid. Subcostal furrow nearly ½ of length of elytron. Intermediate leg with tarsus just over $\frac{1}{2}$ as long again as the tibia ; claws rather longer than the latter.

♂. Free portion of 7th abdominal tergite with a prominent outer setigerous angle, a prominent, though rounded, inner angle, and a concave posterior margin between them. (Plate XXXIV, fig. 2*a*.)

Right clasper slightly dilated proximal to the middle and before the apical bend. (Plate XXXIV, fig. 2*b*.)

Left clasper flattened, slightly bent, flanged apically, the flange bearing scale-like denticulations. (Plate XXXIV, fig. 2*c*.)

Length : ♂, 3·2 mm.
♀, 3·5 mm.

TRANSVAAL.

2 ♂ ♂, 7 ♀ ♀ (*type*, *allotype*, and *paratypes*), Limpopo River, Main Drift, near Messina, pool in sandy bed of river, 28–29, v, 1927 (G.E.H.).

Very close to *M. scutellaris* but slightly smaller and with a toothed flange to the left clasper.

3. *Micronecta hessei* n. sp.

Micronecta scutellaris Hesse, 1925, Ann. S.Afr. M., xxiii, p. 138 (part).

Head greyish-yellow, with an indefinite longitudinal brown stripe on the vertex ; pronotum grey-brown ; elytra greyish ; clavus pale basally, remainder of clavus with a faint irregular brown inset border ; corium grey with indications of four broken longitudinal brown lines ; intermediate leg pale throughout. Head very slightly wider than pronotum and rather more than $2\frac{1}{2}$ times as wide as synthlipsis. Pronotum about $1\frac{2}{5}$ times as long as head and rather under 3 times as wide as long, glabrous, very finely and sparsely punctured, posterior margin convex.

Scutellum rather more than $\frac{1}{2}$ as long as pronotum. Macropterous. Pale line from internal angle of right corium on to membrane, curved.

Intermediate leg with tarsus $1\frac{2}{3}$ times as long as tibia and just over $1\frac{1}{3}$ times as long as claws.

♂. Free portion of the 7th abdominal tergite with a prominent outer setigerous angle, a prominent, though rounded, inner angle, and a concave posterior margin between them. (Plate XXXIV, fig. 3*a*.)

Right clasper very slightly dilated proximal to the middle of the shaft. (Plate XXXIV, fig. 3*b*.)

Left clasper flattened, slightly bent, flanged apically, the flange denticulate on the outer edge only. (Plate XXXIV, fig. 3*c*.)

Length : 3·0 mm.

South-West Africa.

♂ (*type*), Kambele Falls, on Kunene River, March 1923 (S.A.M., Mus. Exp.). The single specimen on which this species is based is one of four originally mounted on one card and referred to *scutellaris* by Hesse. *M. hessei* may be at once recognised by its narrow synthlipsis. This structure is wide in the three ♀ specimens with which it was associated, and they look superficially like small specimens of *scutellaris* (l. 3 mm.), with unicolorous elytra. It is possible that ♂ specimens would indicate that they are referable to an undescribed species.

4. *Micronecta gorogaiqua* n. sp.

Head brownish-yellow, with a central longitudinal stripe of tawny brown. Pronotum grey-brown, paler posteriorly. Elytra grey-brown, base of clavus yellowish-brown, remainder of clavus and corium with obscure darker mottlings. Intermediate leg dark yellow, apex of tarsus and base of claw dark brown.

Head slightly wider than the pronotum and $2\frac{1}{4}$–$2\frac{1}{3}$ times as wide as the synthlipsis.

Pronotum slightly longer than the head, about 3–$3\frac{1}{2}$ times as wide as long, finely rugose, glabrous ; anterior and posterior margins evenly and equally convex.

Scutellum about $\frac{5}{8}$ times as long as the pronotum. Macropterous. Pale line from inner angle of right corium on to membrane nearly straight. Subcostal furrow $\frac{4}{9}$ of length of elytron.

Intermediate leg with tarsus $\frac{1}{2}$ as long again as tibia, or slightly more ; claw a little longer than the latter.

♂. Free portion of the 7th abdominal tergite with a very prominent outer setigerous angle, a rounded inner angle, and an emarginate posterior border between them. (Plate XXXIV, fig. 4*a*.)

Right clasper strongly curved and somewhat flanged in the region of the curvature. (Plate XXXIV, fig. 4*b*.)

Left clasper with a short shaft which is slightly twisted and denticulate apically. (Plate XXXIV, fig. 4*c*.)

Length : 2·7 mm.

CAPE.

♂, Durbanville, Cape Flats, 30, iv, 1927 (L.M.S.).
♂, Paarl, Mountain Reservoir, 22, x, 1927 (L.M.S.).
♂ ♂, ♀ ♀ (*type*, *allotype*, and *paratypes*), Oudtshoorn, 28, xii, 1927.

ORANGE FREE STATE.

♀, Knoffelspruit, Rouxville div., pool in stream, 8, v, 1928 (G.E.P.).
3 ♀ ♀, Diep Kloof, Rouxville div., pool in stream, 9, v, 1928 (G.E.P.).

The specimens from the Orange Free State are rather dark; no ♂ is available, but the identification is fairly certain.

Three specimens from Portuguese East Africa (Magude, C. J. Swierstra, T.M.) belong to a species which might run down to *gorogaiqua* in the key. The head is as wide as, or a little wider than, the pronotum, and about $2\frac{1}{8}$ times as wide as the rather wide synthlipsis; the intermediate legs are entirely yellow. In general *facies* this insect is perhaps nearer *winifreda* or *druryana* than the present species, but it is undoubtedly distinct from any *Micronecta* that I have seen. The absence of a ♂ specimen compels me reluctantly to leave it, the only member of its genus known from that part of Africa, undescribed.

5. *Micronecta winifreda* n. sp.

Head yellow with an orange or greyish clouding on the vertex, and variable indications of orange longitudinal stripes internal to the eyes.

Pronotum grey-brown, scutellum grey-brown, latero-apically paler. Elytra grey-brown, base of clavus greyish-yellow, remainder of clavus with traces of darker inset border, corium with traces of three darker longitudinal lines. Intermediate leg pale or orange yellow, apex of tarsus and base of claw grey or dark brown.

Head narrower than the pronotum and $2\frac{1}{6}$–$2\frac{1}{3}$ as wide as the synthlipsis.

Pronotum $1\frac{1}{4}$–$1\frac{1}{2}$ times as long as head and $2\frac{1}{2}$–$2\frac{3}{4}$ times as wide as long, glabrous, slightly transversely rugose, posterior margin less convex than anterior and often flattened centrally.

Scutellum rather more than $\frac{1}{2}$ as long as pronotum. Macropterous. Pale line from internal angle of right corium on to membrane almost straight. Subcostal furrow $\frac{4}{9}$ of length of elytron.

Intermediate leg with tibia and claw subequal, and tarsus about $1\frac{1}{4}$ times as long as the latter.

♂. Free portion of 7th abdominal tergite with a sub-prominent outer setigerous angle, a fairly well-defined rounded inner angle, and a slightly concave posterior border between them. (Plate XXXIV, fig. 5*a*.)

Right clasper rather broad distally. (Plate XXXIV, fig. 5*b*.)

Left clasper styliform, dilated and membranous apically. (Plate XXXIV, fig. 5*c*.)

Length : 2·3–3 mm.

CAPE.

♂, ♀ ♀, Durbanville, Cape Flats, 30, iv, 1927 (L.M.S.).

♂ ♂, ♀ ♀ (*type*, *allotype*, and *paratypes*), Swellendam, 16, xii, 1926 (G.E.H.).

3 ♀ ♀, Doorns River, between Oudtshoorn and Montagu Pass, 24, xi, 1925 (G.E.P.).

♂, Oudtshoorn Dam, 28, xii, 1926 (G.E.H.).

♀, River above Schoeman's Hoek, Oudtshoorn, 29, xii, 1926 (G.E.H.).

6. *Micronecta druryana* n. sp.

Head dark greyish-yellow, with a central brown stripe not reaching back to its posterior margin and two indefinite brown spots on the vertex, which may be continued up on to the head as tawny stripes ; in some specimens these markings are very indistinct. Pronotum pitchy brown, paler marginally ; scutellum and elytra pitchy brown, basal margin of clavus paler, corium with traces of darker bands. Intermediate leg yellow, very slightly and gradually darkened towards the apex of the tarsus.

Head slightly narrower, or subequal in width to pronotum and just over twice as wide as synthlipsis (type 74 : 35).

Pronotum rather less than twice as long as head, just over $2\frac{1}{2}$ times as wide as long, faintly and irregularly transversely rastrate, glabrous save the convex posterior margin, which is finely pubescent. Scutellum $\frac{3}{5}$–$\frac{2}{3}$ as long as pronotum.

Macropterous. Pale line from inner angle of right corium on to membrane very slightly sigmoid ; subcostal furrow about $\frac{5}{11}$ of length of elytron.

Intermediate leg with the tarsus from just over $1\frac{1}{2}$ to nearly twice as long as tibia, which is rather shorter to rather longer than claws.

♂. Free portion of the 7th abdominal tergite with a prominent setigerous outer angle, a rounded inner angle, and a slightly concave posterior border between them. (Plate XXXIV, fig. 6*a*.)

Right clasper markedly dilated in the basal half of the shaft and less so apically, with a well-defined narrowing between the dilations. (Plate XXXIV, fig. 6*b*.)

Left clasper styliform, somewhat dilated, and with scale-like denticulations apically. (Plate XXXIV, fig. 6*c*.)

Length : ♂, 3·0 mm.
♀, 3·2 mm.

NORTHERN RHODESIA.

♂ ♂, ♀ ♀ (*type*, *allotype*, and *paratypes*), Katombora, backwater of Zambesi, 14, vii, 1927 (G.E.H.).

BECHUANALAND PROTECTORATE.

♂ ♂, ♀ ♀, Kazungula, mouth of Linyanti River, 14, vii, 1927 (G.E.H.).

♂ ♂, ♀ ♀, Sailodelo, above Kabulabula, Linyanti River, 14, vii, 1927 (G.E.H.).

This species is probably common throughout the Linyanti and Upper Zambesi River systems, and is named in honour of Mr. and Mrs. Drury of Kasane.

7. *Micronecta dorothea* n. sp.

Head dirty greenish- or greyish-yellow, with a darker spot on the vertex, which may be obsolete or may be slightly produced backwards as a stripe ; pronotum very dark greyish-brown, posterior margin and scutellum paler ; elytra dark greyish-brown, base of clavus concolorous with scutellum, corium with faint indications of longitudinal blotches ; intermediate legs greyish or brownish-yellow, femur paler, tarsus not darkened apically.

Head and eyes wider than pronotum and just over $1\frac{3}{4}$ times as wide as the synthlipsis.

Pronotum rather shorter than the head and just under $3\frac{1}{2}$ times as wide as long, slightly rugose, disc glabrous, posterior border convex with very short pubescence.

Scutellum rather more than $\frac{1}{2}$ as long again as pronotum.

Macropterous, Pale vein from the inner angle of the right corium on to the membrane sigmoid. Subcostal furrow $\frac{4}{9}$ of length of elytron.

Intermediate leg with the claw and tibia subequal, and the tarsus $1\frac{1}{2}$–$1\frac{3}{4}$ times as long as the latter.

♂. Free lobe of 7th abdominal segment with definite setigerous and inner angles both slightly rounded, and with a convex posterior border between them. (Plate XXXV, fig. 1*a*.)

Right clasper slightly dilated before the middle and gradually narrowed throughout the bend. (Plate XXXV, fig. 1*b*.)

Left clasper styliform, flattened, somewhat dilated apically on the outside, and with small denticulations on the distal half. (Plate XXXV, fig. 1*c*.)

Length : 3 mm.

TRANSVAAL.

Randfontein (*type*, *allotype*, and *paratypes*), dam, 8, viii, 1926, and 8, v, 1927 (G.E.H.).

Florida, near Johannesburg, 14, viii, 1926 (G.E.H.).

Birchleigh, dam, in *Potamogeton*, 28, iv, 1928 (G.E.H.).

" Pan 2," Lake Banagher, near Lake Chrissie, 8, v, 1928 (G.E.H.).

8. *Micronecta butleriana* n. sp.

Head yellow, irregularly blotched with orange. Pronotum dark grey-brown, paler centrally. Elytra dark greyish-brown with a broad band along the basal margin of the clavus, the base of the corium and an indefinite area on the membrane pale stramineous, covered with fine hairs, which are in general dark on the dark regions, pale on the pale. Intermediate leg yellow, apex of tarsus and base of claw darkened.

Head slightly wider than the pronotum and about $2\frac{1}{2}$ times as wide as the synthlipsis.

Pronotum $\frac{2}{3}$ or less as long as the head, rather over $4\frac{1}{2}$ times as wide as long, glabrous, slightly rugose longitudinally, posterior margin slightly thickened, almost straight or very slightly convex.

Scutellum subequal in length to pronotum.

Brachypterous. Wing reaching just beyond middle of the elytra. Pale line from internal angle of right corium on to membrane, straight, confluent with margin of reduced membrane basally. Subcostal furrow $\frac{4}{9}$ of length of elytron.

Intermediate leg with tibia and claw subequal, tarsus just under $\frac{1}{2}$ as long again as either.

♂. Free portion of the 7th abdominal tergite with a prominent outer setigerous angle, a rounded inner angle, and an emarginate posterior border between them. (Plate XXXV, fig. 2*a*.)

Right clasper a very little dilated and slightly and evenly bent subapically. (Plate XXXV, fig. 2*b*.)

Left clasper styliform, somewhat dilated apically, with scale-like denticulations in the distal half. (Plate XXXV, fig. 2*c*.)

Length : 2·0–2·5 mm.

CAPE.

Alice, Tyumie River, 24, iii, 1926 (G.E.P.).

Howieson's Poort, near Grahamstown, 13, iii, 1926 (G.E.P.).

Debe Nek (*type*, *allotype*, and *paratypes*), stream in forest, near Mnqesha, 14, ii, 1926 (G.E.P.).

East London, reservoir, pools " 1 and 2," Westbank (G.E.P.).

This species is distinguished at once superficially by its piebald appearance, and is nearly always larger than the variegated forms of *M. piccanin*. It is named in honour of the late E. A. Butler, my master in hemipterology.

The specimens from " pool 1," East London, are smaller and paler than any others, and present a curious contrast when compared with those from " pool 2." No sharp distinction, however, can be made out, and the genitalia show that there is but a single species involved. The two pools appeared to be identical except in size, " 2 " being larger, and no environmental influences were obvious that might account for the differences. (Notebook, G.E.P.).

9. *Micronecta monomatapae* n. sp.

Head yellow, with a faint longitudinal median tawny stripe. Pronotum dark grey-brown with paler margins, at least posteriorly. Elytra grey-brown with pale pubescence, base of clavus paler, corium with traces of darker mottling. Intermediate leg yellow, apex of tarsus darkened.

Head slightly wider than the pronotum and just under 2½ times as wide as the synthlipsis.

Pronotum subequal in length to head, 3½–4 times as wide as long, very finely rugose, posterior border slightly convex. Scutellum somewhat shorter than pronotum.

Macropterous. Pale line from the inner angle of the right corium on to the membrane almost straight. Subcostal furrow just over ½ as long as elytron.

Intermediate leg with tarsus ½ as long again as tibia, claw slightly shorter than the latter.

♂. Free portion of the 7th abdominal tergite with a prominent outer setigerous angle, a less well-marked inner angle, and a very slightly concave posterior border between them. (Plate XXXV, fig. 3*a*.)

Right clasper not conspicuously dilated nor constricted, except apically. (Plate XXXV, fig. 3*b*.)

Left clasper styliform, straight, with scale-like denticulations apically. (Plate XXXV, fig. 3*c*.)

Length : 1·9–2·0 mm.

SOUTHERN RHODESIA.

3 ♂ ♂ (*type, paratypes*), Khami River, below ruins, near Bulawayo, 27, vi, 1927 (G.E.H.).

2 ♂ ♂, Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

The Salisbury specimens differ from the typical series described above in having slightly longer heads.

10. *Micronecta browni* n. sp.

Pale greyish-brown, head yellowish or yellow with a slight trace of a darker or orange longitudinal stripe. Elytra with basal margin of clavus pale, remainder of clavus with a faintly indicated brown inset border, corium with about three faint brown longitudinal stripes, tending to coalesce anteriorly, and obsolete in some specimens.

Intermediate leg yellowish, concolorous throughout.

Head and eyes slightly narrower than the pronotum and about 2½ times as wide as the synthlipsis.

Pronotum subequal to, to ½ as long again as head, and from just over 2⅔–3 times as wide as long, convex, glabrous, posterior margin as convex as the anterior.

Scutellum slightly more than ½ as long as the pronotum.

Macropterous. Pale line from inner angle of right corium on to membrane straight. Subcostal furrow about 3/7 of length of elytron.

Intermediate leg with tibia and claws subequal, tarsus ½ as long again as either.

♂. Free portion of 7th abdominal tergite with a well-marked setigerous outer angle, a less well-marked inner angle, and a slightly concave posterior border between them. (Plate XXXV, fig. 4*a*.)

Right clasper narrow, pointed, slightly dilated subapically. (Plate XXXV, fig. 4*b*.)

Left clasper styliform, with a scoop-like bend subapically, distal end with fine denticulations. (Plate XXXV, fig. 4*c*.)

Length : 2–2·5 mm.

TRANSVAAL.

♂ ♂, ♀ ♀, Barberspan, common at edge of pan, 6, iv, 1928 (G.E.H.).

SOUTH-WEST AFRICA.

4 ♂ ♂, 5 ♀ ♀ (*type, allotype,* and *paratypes*), Kalkfontein, Gr. Namaqualand, April 1924 (J. S. Brown, S.A.M.).

1 ♂, 2 ♀ ♀, Asab, Gr. Namaqualand, 1924 (J. S. Brown, S.A.M.).

SOUTHERN RHODESIA.

Matopo Dam, near Bulawayo, 10, vii, 1927 (G.E.H.).

Khami River, below ruins near Bulawayo, 10, vii, 1927 (G.E.H.).

This species is easily recognised by the sigmoid apical part of the left clasper, which in sublateral view is often more pronounced than in the figure. Externally it cannot be separated from macropterous *piccanin.*

11. *Micronecta quewalepele* n. sp.

Head dull yellowish, with a central dark elongate spot on the vertex and faint brown spots just inside each eye. Pronotum grey-brown; base of clavus paler, remainder of clavus with traces of a dark inset border; corium with faint confluent longitudinal darker lines. Intermediate leg pale yellow with apex of tarsus slightly darkened.

Head very slightly wider than pronotum and $2\frac{1}{3}$ times as wide as the synthlipsis.

Pronotum very slightly longer than head and about $3\frac{2}{3}$ times as wide as long, finely transversely rugose, with scattered pubescence best marked on the posterior margin, which is convex.

Scutellum rather shorter than pronotum.

Brachypterous. Wings shred-like, reaching to beyond the middle of the elytra. Pale line from internal angle of right corium on to membrane nearly straight. Subcostal furrow $\frac{5}{12}$ of length of elytron.

Intermediate leg with tarsus just under twice as long as tibia, which is rather shorter than claws.

♂. Free portion of 7th abdominal tergite with very rounded angles and an indefinite concave border between them. (Plate XXXV, fig. 5*a*.)

Right clasper narrowed in its middle and somewhat dilated in its distal part. (Plate XXXV, fig. 5*b*.)

Left clasper substyliform, wide, with scale-like denticulations in the distal half, tip rather suddenly bent. (Plate XXXV, fig. 5*c*.)

Length: 1·7 mm.

Caprivi Strip.

1 ♂ (*type*), Linyanti River, between Kasane and Kabulabula, 14, vii, 1927 (G.E.H.).

Taken with *M. simillima* and a single ♂ of *M. bleekiana* in the shallow region at the edge of the river.

12. *Micronecta simillima* n. sp.

Head dirty yellowish-grey with a darker median, and two fainter lateral stripes just internal to each eye. Pronotum grey-brown, basal margin of clavus paler, remainder of clavus with traces of a dark inset border, corium with irregular indications of dark longitudinal lines.

Intermediate leg very pale yellow with faint traces of darkening at the apex of the tarsus.

Head very slightly wider than pronotum and $2\frac{2}{3}$ times as wide as the synthlipsis.

Pronotum slightly longer than head, $2\frac{1}{2}$ times as wide as long, finely transversely rugose, with scattered pubescence, posterior margin convex.

Scutellum about $\frac{1}{2}$ as long as pronotum.

Brachypterous. Pale line from internal angle of right corium on to membrane, short, almost straight. Subcostal furrow about $\frac{5}{11}$ of length of elytron.

Intermediate leg with tarsus rather less than twice as long as tibia, the latter rather shorter than claws.

♂. Free portion of 7th abdominal tergite with a prominent setigerous outer angle, a rounded and rather feeble inner angle, and a slightly concave posterior border between them. (Plate XXXV, fig. 6*a*.)

Right clasper with a flange-like dilation in the proximal two-thirds. (Plate XXXV, fig. 6*b*.)

Left clasper substyliform, apex markedly sigmoid, broad, form of tip somewhat variable. (Plate XXXV, fig. 6*c*.)

Length : 1·7 mm.

Caprivi Strip.

♂ (*type*), Linyanti River, between Kasane and Kabulabula, 14, vii, 1927 (G.E.H.).

Southern Rhodesia.

3 ♂ ♂, Khami River, below ruins near Bulawayo, 21, vi, 1927 (G.E.H.).

The type was taken with the type of *M. quewalepele,* a single ♂ of *M. bleekiana,* and four ♀ ♀. The latter, which from their size might belong to either of the two former, are almost certainly referable to *simillima,* with which they agree in the width of the synthlipsis. The pronota in these specimens are $2\frac{6}{7}$–3 times as wide as long, *i.e.* intermediate between the types of *simillima* and *quewalepele.* Both these characters are probably variable, and it is dangerous to attempt to name females in mixed series, or to attempt a separation of such from *M. piccanin* f. *piccanin.*

13. *Micronecta bleekiana* n. sp.

Head pale greyish-yellow with an indefinite tawny stripe on the vertex, or with a brown stripe and two tawny patches just within the eyes ; pronotum and elytra light brownish-grey ; the posterior margin of the former pale, clavus with an anterior pale margin, remainder with traces of a darker inset border, corium with indications of four confluent longitudinal darker bands ; intermediate leg pale yellow ; tip of tarsus and base of claw greyish.

Head slightly narrower than the pronotum and rather under $2\frac{1}{2}$ times as wide as the synthlipsis (type 51 : 22).

Pronotum about $2\frac{1}{2}$ times as wide as long, distinctly longer than the head, very minutely rugose, slightly and very finely pubescent, posterior margin convex.

Scutellum about $\frac{1}{2}$ as long as the pronotum.

Macropterous. Pale line from internal angle of right corium on to membrane almost straight. Subcostal furrow about $\frac{5}{11}$ of length of elytron.

Intermediate leg with tarsus $\frac{1}{2}$ as long again as tibia or rather less, claw a little shorter than the latter.

♂. Free portion of 7th abdominal segment gradually narrowed posteriorly towards the setigerous lobe with very little indication of an internal angle. (Plate XXXV, fig. 7*a.*)

Right clasper very slightly dilated in the basal part of the shaft. (Plate XXXV, fig. 7*b.*)

Left clasper somewhat flattened basally, slightly bent and grooved apically, the distal half ornamented with small scale-like denticulations. (Plate XXXV, fig. 7*c.*)

Length : 2·5 mm.

CAPRIVI STRIP.

♂ (*type*), ♀ ♀ (*allotype* and 4 *paratypes*), vlei at Kabulabula, Linyanti River, 16, vii, 1927 (G.E.H.).

♂, Linyanti River, between Kasane and Kabulabula, 14, vii, 1927 (G.E.H.).

SOUTHERN RHODESIA.

♂, ♀ ♀, Drift over Hunyani River, near Salisbury, 3, vii, 1927 (G.E.H.).

♂ ♂, ♀ ♀, Makabusi River, near Salisbury, 3, vii, 1927 (G.E.H.).

NORTHERN TRANSVAAL.

♂ ♂, ♀ ♀, Limpopo River, Main Drift near Messina, 28, vi, 1927 (G.E.H.).

Named in honour of Miss D. F. Bleek, to whom I am indebted for much valuable information relating to the country of the Upper Zambesi.

14. *Micronecta citharistia* n. sp.

Head yellow with a longitudinal brown stripe, which is somewhat dilated on the vertex; pronotum grey-brown; elytra grey-brown, base of clavus paler, remainder of clavus with a faint and irregular inset darker border, corium with two obsolescent longitudinal lines anastomosing to form faint blotches basally, centrally, and apically, and a darker suffusion near the inner angle, all very faint; intermediate leg pale yellow, hardly, if at all, darker at the apex of the tarsus.

Head as wide as, or a little wider than, the pronotum and about $2\frac{1}{3}$ times as wide as the synthlipsis.

Pronotum slightly shorter than the head, 3–$3\frac{1}{2}$ times as wide as long, glabrous, slightly irregularly rugose, posterior margin convex.

Scutellum from $1\frac{1}{3}$–$1\frac{3}{4}$ times as long as pronotum.

Brachypterous. Wings reaching to about second third of abdomen; pale line from internal angle of right corium on to membrane practically straight. Subcostal furrow $\frac{5}{12}$ of length of elytron.

Intermediate leg with tarsus about $\frac{1}{2}$ as long again as the tibia and $1\frac{1}{4}$–$1\frac{1}{3}$ times as long as the claw.

♂. Free portion of 7th abdominal tergite with a well-marked outer setigerous angle, a very rounded inner angle, and no definite border between them. (Plate XXXVI, fig. 1*a*.)

Right clasper very slightly dilated beyond middle and very little bent. (Plate XXXVI, fig. 1*b*.)

Left clasper very broad and flattened, with well-developed basal lobes, apex minutely denticulate. (Plate XXXVI, fig. 1*c*.)

ORANGE FREE STATE.

Knoffelspruit, Rouxville dist., pool in stream, 8, v, 1928 (G.E.P.).

Diep Kloof, Rouxville dist., pool in stream, 9, v, 1928 (G.E.P.).

CAPE.

Pool in stream below Cango Caves, Oudtshoorn dist., 29, xii, 1926 (G.E.H.).

Teafontein, near Grahamstown, Sept. 1910 (Nurse A. M. Leppan).

Debe Nek, Mnqesha River, 2, iii, 1926 (G.E.P.).

Dordrecht, Wodehouse dist., dam 2 miles east of, 30, iv, 1928 (G.E.P.).

TRANSVAAL.

(*Type*, *allotype*, and *paratypes*), Fonteinblaauw, near Johannesburg, 1, viii, 1926, and 9, iv, 1927 (G.E.H.).

Dunswart, Boksburg dist., 15, v, 1927.

The specimens from Teafontein are paler, have slightly longer heads, and a rather short, broad, external basal lobe on the left clasper. The occurrence of typical specimens at Debe Nek makes it unsafe to distinguish their form as a southern race.

My attention was first drawn to this species in the Klein Yokskei River at Fonteinblaauw by hearing its stridulation, which is similar to that of *Micronecta minutissima*.

15. *Micronecta uvarovi* Jacz.

Micronecta uvarovi Jaczewski, 1926, Ann. Mag. Nat. Hist. (9), xx, p. 494 (figs.).

Head yellow, with a central tawny stripe and two faint brownish spots just internal to each eye; pronotum greyish-brown, paler posteriorly; scutellum greyish-brown; elytra brownish-grey, anterior margin of clavus paler, remainder of clavus with traces of an inset border, corium with very faint linear dark markings; intermediate leg yellow, slightly darkened at apex of tarsus.

Head very slightly narrower than pronotum, just over $2\frac{1}{2}$ times as wide as synthlipsis.

Pronotum just under $\frac{1}{2}$ as long again as head and just over $2\frac{1}{2}$ times as wide as long, slightly flattened centrally, with indications of a faint longitudinal carina, minutely and irregularly rugose, finely pubescent, posterior margin convex.

Scutellum slightly shorter than head.

Macropterous. Pale line from internal angle of right corium on to membrane straight. Subcostal furrow $\frac{5}{11}$ of length of elytron.

Intermediate leg with tarsus about $1\frac{2}{3}$ times as long as tibia, which is slightly longer than claws.

♂. Free portion of 7th abdominal tergite with a well-defined rounded setigerous outer angle, a very rounded inner angle, and a short, indefinite, concave border between them. (Plate XXXVI, fig. 2*a*.)

Right clasper much dilated subapically. (Plate XXXVI, fig. 2*b*.)

Left clasper with shaft flat, subtriangular, apico-externally, with a few minute spines. (Plate XXXVI, fig. 2*c*.)

Length :. 2·2 mm. (2·5 mm., *fide* Jaczewski).

NATAL.

(*Type* and *paratypes*), Weenen, xi, 1923 to i, 1924 (Thomaset, *fide* Jaczewski).

SOUTHERN RHODESIA.

♂, Drift over Hunyani River near Salisbury, 3, vii, 1927 (G.E.H.).

My specimen was associated with three specimens of *M. bleekiana*, with which it might easily be confused superficially. The genitalia are very distinctive, and have allowed me to identify the Salisbury individual described above with Jaczewski's species, of which he has figured these organs.

16. *Micronecta piccanin* n. sp.

Brachypterous form.—Head pale yellow with a median longitudinal tawny line; pronotum grey-brown; scutellum yellowish-grey; elytra grey-brown, base of clavus yellowish-grey, corio-clavai suture narrowly black, outer margin of membrane often darkened; intermediate leg pale yellow, apex of tarsus and base of claw slightly darkened; abdomen below yellowish-grey in ♀, dark except apically in ♂.

Head slightly wider than the pronotum and $2\frac{1}{4}$ times as wide as the synthlipsis.

Pronotum $3\frac{1}{3}$–$4\frac{1}{3}$ times as wide as long and about $\frac{2}{3}$ as long as the head, glabrous, slightly transversely wrinkled, posterior border very slightly convex.

Scutellum almost as long as pronotum.

Wing rudiments reaching to about the second third of the abdomen, pale line from inner angle of right corium on to membrane subobsolete. Subcostal furrow $\frac{2}{5}$ of length of elytron.

Intermediate leg with tarsus about twice as long as the tibia or a little less, claws from rather longer than tibia to $\frac{1}{2}$ as long again (type, 5 : 10 : 7·5).

♂. Free portion of 7th abdominal tergite with the outer setigerous angle obsolete, the posterior part being formed from the inner angle, which is rounded. (Plate XXXVI, fig. 3*a*.)

Right clasper with a flange-like dilation along the shaft, the apical part of which appears straight. (Plate XXXVI, fig. 3*b*.)

Left clasper styliform, apex membranous. (Plate XXXVI, fig. 3*c*.)

L. 1·7 mm.

Macropterous form.—Head about $\frac{3}{4}$ as long as pronotum, the latter about $2\frac{3}{4}$ times as wide as long. Membrane and wings fully developed ; pale line from internal angle of right corium on to the former slightly curved posteriorly. Subcostal furrow $\frac{1}{9}$ of length of elytron.

Length : 2·2 mm.

This species is exceedingly variable in colour. The following names are proposed for colour forms.

form *piccanin*. (Plate XXXVI, fig. 5.)

The typical form has been described above—some slight departure from this coloration occurs in most series of individuals which must undoubtedly be considered as belonging to this form. Usually some individuals are found which have two linear spots on the corium more or less dark. These spots foreshadow the heavier black pigmentation of the forms *audax* and *perversa* described below. They occur in all the longer series mentioned below, save from Debe Nek. The Pirie Forest specimens are uniformly rather different from any others ; the ground colour of the elytra is pale, there are two spots on the clavus and several on the corium. Examination of material from Swellendam and Ceres suggests that the black spots tend to be better developed on the corium of macropterous than brachypterous specimens. None of these forms is sufficiently well marked to require varietal names.

The typical form seems to be absent from the Cape Peninsula and Flats. The most westerly specimen, recorded from Paarl below, has black on the corium, and is transitional to F. *audax*, with which it occurred.

CAPE.

brachypt., Paarl, Mountain Reservoir, 22, xi, 1927 (L.M.S.).
brachypt., Du Toit's Kloof, 16, iv, 1927 (L.M.S.).

6 macr., 1 brachypt., Wolseley, Ceres Road, stream, 9, xii, 1926 (G.E.H.).
brachypt., Ceres, 9, xii, 1926 (G.E.H.).
3 macr., 8 brachypt., Swellendam, 16–17, xii, 1926 (G.E.H.).
brachypt., Oudtshoorn River, 28, xii, 1926 (G.E.H.).
brachypt., below Cango Caves, 29, xii, 1926 (G.E.H.).
brachypt., river above Schoeman's Hoek, 29, xii, 1926 (G.E.H.).
brachypt., Avontuur, 6, i, 1927 (G.E.H.).
brachypt., Assegaibosch, Kromme River, 8, i, 1927 (G.E.H.).
brachypt., Alice, 24, ii, 1926 (G.E.P.).
brachypt. (*type*, *allotype*, and *paratypes*), Debe Nek, stream in forest, 27, ii, 1927 (G.E.P.).
brachypt., Pirie Forest, second drift above dam, 19, ii, 1926 (G.E.P.).

TRANSVAAL.
brachypt., Randfontein, 8, viii, 1926 (G.E.H.).
brachypt., Witpoortje, Krugersdorp div., 2, iv, 1927 (G.E.H.).
1 macr., Rivonia, near Johannesburg, 7, xi, 1926 (G.E.H.).
2 macr., 3 brachypt., Northumbria, near Johannesburg, 6, ii, 1927.
brachypt., Fonteinblaauw, near Johannesburg, 9, iv, 1927 (G.E.H.).
2 macr., 21 brachypt., Waterval Boven, river, 16, iv, 1927 (G.E.H.).
brachypt., Louis Trichardt, irrigation trench and dam, 21–24, v, 1927 (G.E.H.).
2 macr., Louis Trichardt, drift over stream, 26, v, 1927 (G.E.H.).

NATAL.
1 brachypt., Ifafa, 26, x, 1926 (C. Ackerman, Natal Museum).

SOUTHERN RHODESIA.
brachypt., Zimbabwe, stream, 8, vii, 1927 (G.E.H.).

form *pardina* n. (Plate XXXVI, fig. 6.)

Clavus with small black spots, particularly in its anterior part; corium with black spots arranged roughly in four or five irregular rows, and partially confluent in some specimens.

CAPE.
♂ ♂, ♀ ♀, brachypt., Durbanville Flats, 30, v, 1927 (L.M.S.).
♂, ♀ ♀, brachypt., Cape Flats (S.A.M.).
♀, macr. (*type*), Swellendam, dam near station, 16, xii, 1926 (G.E.H.).

form *tigrina* n. (Plate XXXVI, fig. 7.)

Sublateral parts of pronotum, a stripe on clavus along the corio-claval suture and three stripes on the corium black.

Cape.

♀, brachypt. (*type*), Alice, Tyumie River, 23, ii, 1926 (G.E.P.).

form *audax* n. (Plate XXXVII, fig. 1.)

Sublateral parts of pronotum, posterior angle of clavus, corio-claval suture, an elongate spot in the anterior angle of corium, two confluent spots on the corium, the outer one more anterior, and the membrane subapically, black.

Cape.

♂ ♂, ♀ ♀, brachypt., Kirstenbosch, pool in Nat. Botanic Garden, 5, ii, 1927 (L.M.S.).

♂, ♀, brachypt. (*type* and *allotype*), Grabouw, Palmiet River, 7, iv, 1926 (G.E.P.).

1 ♂, 2 ♀ ♀, Paarl, Mountain Reservoir, 22, x, 1927 (L.M.S.).

♀, brachypt., Ceres, 9, xii, 1926 (G.E.H.).

A single specimen from Zimbabwe has the heavy corial markings of the succeeding two forms, but the clavus has no basal black spot. The apical spot, however, is very diffuse, and covers the greater part of the clavus. The other specimens in the series are *piccanin.*

form *variegata* n. (Plate XXXVII, fig. 2.)

As *audax*, but with a black blotch at the base of the clavus as well as in its posterior angles. Corial markings confluent, solid, and heavier.

Cape.

♂ ♂, ♀ ♀, brachypt. (*type*, *allotype*, and *paratypes*), Swellendam.

2 ♂ ♂, 2 ♀ ♀, brachypt., George, Zwart River, 19, xii, 1926 (G.E.H.).

The specimens from George show partial confluence of the claval spots and are therefore transitional to *nigroclavata.*

form *nigroclavata* n. (Plate XXXVII, fig. 3.)

As *variegata,* but with clavus entirely black save a narrow line along the corio-claval suture.

Cape.

♂ ♂, ♀ ♀ (*type, allotype,* and *paratypes*), Wittelsbosch, backwater of a river among Palmiet, 9, i, 1927 (G.E.H.).

♂ ♂, ♀ ♀, Assegaibosch, Kromme River, 8, i, 1927 (G.E.H.).

In the Wittelsbosch series three specimens among twenty-two are macropterous.

form *perversa* n. (Plate XXXVII, fig 4.)

Spot in posterior angle of clavus, corio-claval suture, a short line just within the latter on the corium and an irregular inset triangular border to the remainder of the latter black.

Cape.

♂ ♂, ♀ ♀ (*type, allotype,* and *paratypes*), Assegaibosch, Kromme River and Stream, 8–12, i, 1927.

A curious and very large brachypterous individual may be mentioned here. Though 2·5 mm. long it appears to belong to *piccanin,* its ♂ genitalia being quite characteristic. The corio-claval suture is markedly dark, and there is a black border to the rest of the internal as well as the external border of the corium ; the clavus is unmarked. Its colour pattern on the whole suggests an intermediate between *perversa* and typical *piccanin,* the markings of the corium are more peripheral than in the former (Debe Nek, stream in forest, 27, iii, 1926 (G.E.P.)).

It will be noted from the foregoing that a definite series of forms *audax, variegata,* and *nigroclavata* occur in the coastal region of the Cape Province along with typical *piccanin,* and that the darkest member of the series occurs in the east, while the least dark is found in the west. The other forms appear to be distributed sporadically, though *pardina* is apparently racial on the Cape Flats. This insect would probably lend itself to genetical research.

17. *Micronecta youngiana* n. sp.

Head dull yellow ; pronotum greyish-brown, paler marginally ; elytra grey-brown, base of clavus paler, apical angle of clavus with a faint darker cloud, external part of corium greyish-yellow with a dark cloud in the middle of the margin, disc of corium with two ill-defined, broad, linear, darker markings ; intermediate leg pale yellowish, apex of tarsus and claw brownish.

Head subequal in width to pronotum and just over twice as wide as the synthlipsis.

Pronotum $3\frac{1}{4}$–$3\frac{3}{4}$ times as wide as long and distinctly longer than head, glabrous, very faintly rugose, posterior margin very slightly convex.

Scutellum $\frac{1}{2}$–$\frac{2}{3}$ as long as pronotum.

Macropterous. Pale line from inner angle of right corium on to membrane slightly sigmoid. Subcostal furrow $\frac{3}{7}$ of length of elytron.

Intermediate leg with tibia subequal to, or a little longer than, the claws; tarsus twice as long as the latter or a little less.

♂. Free portion of 7th abdominal tergite with a very well-developed, acutely-rounded, internal angle, and an obsolete setigerous angle. (Plate XXXVI, fig. 4*a*.)

Right clasper very flattened. (Plate XXXVI, fig. 4*b*.)

Left clasper strongly sigmoid, chitinised throughout. (Plate XXXVI, fig. 4*c*.)

TRANSVAAL.

2 ♂ ♂, 5 ♀ ♀, Waterval Boven, edge of river, 15, iv, 1927.

This species occurred with *M. piccanin* at one locality between the hotel and the waterfall. Collections of *piccanin* made at other spots along the river show no admixture with *youngiana*. The latter may be roughly separated in the field by its slightly more variegated coloration.

I have much pleasure in associating this species with my friend Mr. R. G. N. Young, who was present at its capture.

Subfam. CORIXINAE.

This subfamily includes moderate-sized or small species included in rather more than a dozen genera, of which but two are South African.

1. (2) Pronotum and elytra unicolorous.
Anterior femur with simple pubescence basally in both sexes. Strigil borne on a posterior projection of the 6th abdominal tergite, which overlaps the 8th . . . . . *Agraptocorixa* Kirk.

2. (1) Pronotum and elytra with black transverse markings. ♂ with a stridulatory area of modified hairs on the inside of the anterior femur. Strigil hardly overlapping the 7th abdominal tergite.
Sigara F.

Agraptocorixa Kirk.

Corixa (*Agraptocorixa*) Kirkaldy, 1898, Ann. Mus. Civ. Sto. Nat. Genov. (ii), xix, p. 144.
„ „ „ 1899, Entom., xxxii, p. 194.

Agraptocorixa Kirkaldy, 1906, Tr. Am. Ent. Soc., xxxii, p. 117.
,, Jaczewski, 1926, Ann. Zool. Mus. Pol. Hist. Nat., v, 1, p. 18.
,, ,, 1926, *Ibid.*, v, ii, p. 94.
,, ,, 1927, Ann. Mag. Nat. Hist. (9), xx, p. 439.

Pronotum and elytra unicolorous. Pronotum lightly and irregularly rugose. Elytra neither rastrate nor punctate. Inner boundary of left membrane well defined. Posterior tarsi pale throughout. Anterior femur with a simple pubescent basal area in both sexes. Strigil present on a posterior projection of the right side of the 6th abdominal segment, overlapping the 8th tergite. Moderate to large species (6–11 mm. long).

This genus is recorded from Somaliland (*gestroi* Kirkaldy), Sudan (*dakarica* Jacz.), and French Senegal (*senegalensis* Jacz. and *dakarica* Jacz.) in Africa, from Madagascar (*impicta* Bergr.*), and from India, Java, and Sumatra in the Oriental Region (*hyalinipennis* F.). A single new species is found in Africa south of the Zambesi. For a further discussion of the genus, see Jaczewski (1926, *l.c.*, p. 94).†

Agraptocorixa swierstrai n. sp.

♂. Head yellowish, posterior dorsal margin dark brown. Notocephalon with a row of irregularly placed punctures along the inner margin of the eye running down into the face, and another row more central to this, which becomes irregular and obsolete on the face.

Face with a flattened area below and extending a little up between the eyes, covered with long, fine, pale hairs. (Plate XXXVII, fig. 5.)

Pronotum nearly twice as wide as long; lateral angles acute, with a faint, low, longitudinal carina which does not reach the anterior margin; greyish-yellow, without markings, lightly punctured with a vestiture of short sparsely-placed hairs, which are longer than the rest.

Scutellum just exposed behind the pronotum between the bases of the elytra, somewhat pubescent.

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* Kirkaldy (Ann. Ent. Soc. Fr., 1899, p. 104) refers to *C. impicta* Bergroth *in litt.*, and states that it belongs to *Agraptocorixa*. I regret I am unable to find any description of this species, and suspect *impicta* to be a *nomen nudum*.

† Lundblad (Ark. för Zool., 20A, No. 6, 1928) has recently placed the Australian *Porocorixa* Hale as a synonym of *Agraptocorixa* Kirk. This renders my generic diagnosis partially invalid, as some of the Australian species do not exhibit the specialised posterior position of the strigil.

Elytra dark greyish-yellow, without markings, covered with a vestiture of short and conspicuous hairs.

Wings developed.

Anterior trochanter without a hair pencil; femur with inner surface pubescent in the proximal half, distal half with small spines which at the boundary of the pubescence are modified to form a short comb of about four spines, while two are enlarged at the apical end; external surface of femur pubescent except apically. Pala over twice as long as tibia, very flat, wide, and pointed, with a row of seventeen to twenty pegs; claw serrated basally. (Plate XXXVII, fig. 8.)

Intermediate legs with short spines, tarsus rather less than $\frac{1}{2}$ as long as tibia and about $\frac{3}{4}$ as long as the claw (type 61 : 34 : 43).

Posterior femur dorsally with a longitudinal band of spinous hairs near the inner margin in the distal part (Plate XXXVII, fig. 6); ventrally with proximal pubescent area, and distal non-pubescent area with short spines enlarged to form a spine row on the outer margin (Plate XXXVII, fig. 7); inner margin with a group of about four spines and a tuft of hairs subapically.

Strigil on the right-hand side, borne on a posterior projection of the 6th abdominal tergite, which reaches back and lies over part of the 8th tergite (Plate XXXVII, fig. 9); irregularly ovoid, with nine rows of plates (Plate XXXVII, fig. 10).

Right clasper broad, rather short, and styliform. (Plate XXXVII, fig. 12.)

Left clasper large and beak-shaped. (Plate XXXVII, fig. 13.)

♀ head as in ♂, but with hairy area not flattened.

Pala narrower and without pegs.

Xyphus very small and obtusely rounded (damaged by pinning in ♂ ♂). (Plate XXXVII, fig. 11.)

Length: 9–10 mm.

PORTUGUESE EAST AFRICA.

2 ♂ ♂, 7 ♀ ♀ (*type*, *allotype*, and *paratypes*), Magude, 16, vii, 1915, C. J. Swierstra (T.M.).

This species would be determined as *A. senegalensis* in Jaczewski's key. From this species it differs only in the greater number of comb plates in the strigil (9 instead of 5). Both differ from *gestroi* Kirkaldy in having the intermediate claws longer than the tarsus. *A. dakarica* Jacz. is a much smaller species (l. 7 mm.) with obtuse lateral pronotal angles.

Sigara Fabr.

Sigara Fabricius, 1775, Systema Entomologiae, p. 691,
,, Schumacher, 1924, D. Ent. Zeit., 1924, p. 337.
,, Jaczewski, 1927, Ann. Zool. Mus. Pol. Hist. Nat., vi, 1, p. 39.
Arctocorisa Wallengren, 1894, Ent. Tidskv., p. 159.
Callicorixa Jaczewski, 1924, Ann. Zool. Mus. Pol. Hist. Nat., T. iii, Z. 1–2, p. 29.

Pronotum and elytra yellow and black or dark brown, marked in transverse stripes or irregular guttulations. Pronotum rastrate, elytra rastrate or smooth, never punctate.

Posterior tarsi usually pale throughout. Strigil, if present, on the right side of the 6th abdominal tergite of the ♂, and hardly, if at all, overlapping the 7th.

Medium-sized species, 5–10 mm. long.

The genus *Sigara* as now understood (Jaczewski, *l.c.*) has been divided into two subgenera by Jaczewski, one the typical *Sigara*, the other *Anticorixa* Jacz. (Ann. Zool. Mus. Pol. Hist. Nat., iii, 1–2, p. 76), containing certain Palaearctic species (*sahlbergi* Fieb., *linnaei* Fieb., *moesta* Fieb., etc.) which resemble *Corixa* in a number of characters, particularly the trapezoidal lateral lobes of the prothorax, and undoubtedly form a natural group. This same author sinks *Callicorixa* B.-W. in *Sigara* Fabr. Such a course is entirely justified by his discovery of a species, *S. jensen-haarupi*, from the Argentine (*l.c.*, vi, 3, p. 253), in which there is no strigil, but which is clearly, from the shape of its right paramere, more closely allied to the other Neotropical species than to the group of Palaearctic ones formerly placed in the separate genus *Callicorixa*. It is, however, possible that the latter should be retained as a subgeneric name for *S. praeusta* Fieb. and its allies. The same author has also arranged the remaining Palaearctic species in a number of groups, but none of the Ethiopian forms known to me belong to any of these. The very broad-toothed right parameres, moreover, suggest a much closer alliance between the African forms and those described by Jaczewski from South America (*l.c.*, vi, 1, p. 3 ; iii, 3, p. 251). There is a tendency among these Neotropical and Ethiopian species for the rastration to be obsolete over part or all of the elytra and pronotum.

Relatively few species of *Sigara* are known from the Ethiopian region, and but four have occurred in South Africa.

Key to the South African Species of Sigara (s.str.) Fabr.

1. (2) Pubescence on the distal part of the under surface of the posterior femur not reaching the centre of the latter in the mid-line *meridionalis* (Wallgr.).
2. (1) Pubescence on distal part of the under surface of the posterior femur reaching at least to the centre in the mid-line. Head not produced forward.
3. (4) Larger 6·5–7 mm. long. Pala of the ♂ darkened externally *sjöstedti* (Kirk.).
4. (3) Smaller 5–6 mm. long.
5. (6) Pronotum with eight pale transverse lines. Facial impression of the ♂ with a median tubercle on its upper border . . *contortuplicata* (Kirk.).
6. (5) Pronotum with seven pale transverse lines. Facial impression of ♂ without a tubercle . . . . *ceres* n. sp.

1. *Sigara* (*S.*) *sjöstedti* (Kirk.).*

Arctocorisa sjöstedti Kirkaldy, 1910, Wiss. Erg. Schwed. Exp. Kilimandjaro, etc. II Gerridae, Corixidae, and Notonectidae, p. 12.

? *Corisa pectoralis* Fieber, 1851, Abh. Böhm. Ges. Wiss., v, p. 52.

Head yellow or brownish; pronotum black with about eight pale transverse lines, some of the first five usually divided, anastomosed, or broken; elytra black; clavus with entire yellow transverse lines anteriorly, the rest of its area, the corium, and the right membrane with very fragmented vermiculate yellow lines which are not arranged in longitudinal series, cuneus with a little dark marking, left membrane less strongly marked than right externo-basally, fading to milky interno-apically; thorax and abdomen below pale testaceous yellow, sometimes clouded with grey.

Head with vertex anteriorly obtusely rounded, posterior margin slightly produced backwards in the mid-dorsal line.

Pronotum about 1⅔ times as wide as long, rounded posteriorly, lateral angles very obtuse, median longitudinal carina traceable through one-half to the whole of its length, rastrate.

Elytra with a vestiture of sparsely placed hairs; clavus but not corium rastrate.

Xyphus acute but rounded apically. (Plate XXXVIII, fig. 1*b*.)

Intermediate leg with the claw about 1¼ times as long as the tarsus, which is about ⅔ as long as the tibia.

Posterior femur dorsally with a well-marked subtransverse row of hairs basally and a couple of small spines in the distal region; anterior margin with about four well-developed spines distally; posterior margin with a row of about four spines and long hairs subapically; ventrally with the pubescent proximal area reaching the middle in the mid-line, with a few scattered spines near the posterior margin in the glabrous distal part. (Plate XXXIX, fig. 1*a* and *b*.)

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* Since the above was written, Lundblad (Ark. för Zool., 20A, No. 8, 1928) has published an exhaustive redescription of this species.

♂. Facial impression moderate, extending up and slightly narrowed between the eyes, reaching to about $\frac{1}{2}$ the length of the interocular space as seen from below ; anterior margin indefinite, without carina, tubercle, or thickening. (Plate XXXVIII, fig. 1*a*.)

Anterior trochanter without a hair pencil.

Pala somewhat arched, narrowed apically, with a curved row of about twenty-five teeth, posterior part blackened.

Strigil elongate with four to five rows of teeth. (Plate XXXVIII, fig. 1*c*.)

Right clasper with an irregular crest and ventrally toothed apex. (Plate XXXVIII, fig. 5.)

Length : 6·5–7 mm.

CAPE.

Constantia Nek, 15, xi, 1926 (L.M.S.).
Lakeside Vlei, 19, i, 1927 (G.E.H.).
Grabouw, Palmiet River, 7, iv, 1926 (G.E.P.).
Wellington, pools, 15, v, 1927 (L.M.S.).
Wolseley, small stream, 5, xii, 1926 (G.E.H.).
Ceres, 5–6, xii, 1926 (G.E.H.).
Swellendam, 12, xii, 1926 (G.E.H.).
Oudtshoorn, river above Schoeman's Hoek, 29, xii, 1926 (G.E.H.).
Knysna, pond, 21, xii, 1926 (G.E.H.).
Parkers Sta., Knysna Forest, 22, xii, 1926 (G.E.H.).
Avontuur, pond, 6, i, 1927 (G.E.H.).
Wittelsbosch, Humansdorp div., 11, i, 1927 (G.E.H.).
Blaauwkrantz Valley, near Bathurst, 9, iii, 1926 (G.E.P.).
Pirie Mission, pool in stream bed, 2, iii, 1926 (G.E.P.).

TRANSVAAL.

Randfontein, dam, 8, viii, 1926 (G.E.H.).
Witpoortje, Krugersdorp dist., 12, ix, 1926 (G.E.H.).
Waterval Boven, pool near river, 15, iv, 1927 (G.E.H.).
Lake Chrissie, pool in dried stream bed, 9, v, 1928 (G.E.H.).
Moordrift, Waterberg dist., ix, 1924 (G. van Dam, T.M.).
Plat River, Waterberg dist., 6–18, iv, 1905 (C. J. Swierstra, T.M.).
Limpopo River, pool in river bed, Main Drift near Messina, 28, v, 1927 (G.E.H.).

SOUTHERN RHODESIA.

Khami River, below ruins near Bulawayo, 27, vi, 1927 (G.E.H.).
Nyombi, on Fort Victoria-Gwelo Railway, 5, vii, 1927 (G.E.H.).
Great Zimbabwe, 7, vii, 1927 (G.E.H.).

South African material appears to be indistinguishable from a series from Kampala, Uganda, sent to me by Mr. G. L. R. Hancock, which I have no hesitation in identifying with *Sigara* (*S.*) *sjöstedti* Kirk. The type came from the Kilimandjaro region. Fieber's *pectoralis* is described from a ♂ in the Berlin Museum and is probably conspecific, in which case the name has priority over *sjöstedti*. It is stated to have the body below an ochreous white with a black centre to the xyphus. This coloration I have never seen in *sjöstedti*, but *Sigara* is a notoriously variable genus. The palae in *pectoralis* are described in these words, " palis cultratis, basi non productis, dorso arcuatis, nigrofuscis," which answers tolerably well to those of *sjöstedti*. Fieber's figure of the pala, however, shows an elongate narrow structure unlike the face of that of any *Sigara* known to me, and I cannot help thinking that the drawing represents the organ edge on. Fieber's locality is "Promontorium Bonae Spei," an indefinite term ; the type presumably still exists at Berlin,* and its examination would at once show if my suspected synonymy is correct.

2. *Sigara* (*S.*) *meridionalis* (Wallgr.).

Corisa meridionalis Wallengren, 1875, Defr. Ak. Vet. Förk., xxxiii, p. 136.

Head dark brown ; pronotum black with seven to eight pale lines, the anterior ones tending to divide and anastomose; elytra black with yellow markings, clavus with yellow transverse markings, entire, anteriorly fragmented, and sometimes forming three longitudinal series posteriorly ; corium with very fragmented yellow markings sometimes broken into four ill-defined longitudinal series, inner angle of corium black ; suture of membrane narrowly brown, right membrane with fragmented vermiculate markings, left membrane paler, fading to yellowish interno-apically. Greyish-yellow below, base of abdomen darker. Pronotum $1\frac{4}{5}$ times as wide as long, posteriorly obtusely rounded ; lateral angles subrectangular ; carina conspicuous on the anterior fifth or quarter, just traceable posteriorly ; rastrate.

Elytra with a conspicuous vestiture of sparsely placed hairs ; clavus feebly but distinctly rastrate ; corium not rastrate.

Intermediate tarsus about $\frac{5}{6}$ as long as the claws, which are slightly shorter than the tibia. Posterior femur dorsally with a few hairs basally and a row of about five spines distally near the posterior border; anterior border with three spines in its distal half; posterior border with a row of about four spines and long hairs subapically; ventrally with proximal pubescent area not reaching the middle in the mid-line, area covered with spines except at its anterior margin. (Plate XXXIX, fig. 2.)

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* Dr. Lundblad (*in litt.*) informs me that the type is lost but that the Fieberian collection contains *sjöstedti* from the Cape, collected " by Krebs . . . who collected *pectoralis* there." He agrees that the former species should be treated as a synonym of the latter.

Xyphus subequilateral, apex obtusely rounded. (Plate XXXVIII, fig. 2*b*.)

♂. Head produced in front between the eyes as a rounded subacute prominence, about ½ as long as the median length of the notocephalon between the eyes; slightly produced backward in the mid-dorsal line. (Plate XXXIX, fig. 5.)

Facial impression elongate ovoid; extending almost to the anterior margin of the produced head and fairly deep, particularly in its anterior half; with two slightly raised elongate areas in its posterior half; anterior edge definite, but without tubercle or carina. (Plate XXXVIII, fig. 2*a*.)

Pala elongate cultrate, slightly bent upwards and downwards on either side of the mid-line, with a single row of about twenty-three pegs (Plate XXXIX, fig. 8). Anterior trochanter without a hair pencil.

Strigil ovoid, with four to five tooth rows. (Plate XXXVIII, fig. 2*c*.)

Right clasper suddenly dilated subapically, gradually and then suddenly constricted with a large tooth-like angle within the apex. (Plate XXXVIII, fig. 6.)

Length: ♂, 6–6·8 mm.
♀, 7–7·5 mm.

CAPE.

Constantia Nek, 19, xi, 1926 (L.M.S.).

Lakeside Vlei, Cape Flats, 11, ix, 1926; 9, x, 1926 (L.M.S.); 19, i, 1927 (G.E.H.)

Princess Vlei, Cape Flats, 12, i, 1927 (G E H.).

Zeekoe Vlei, Cape Flats, weedy pool, 24, x, 1926 (L.M.S.).

Ronde Vlei, Cape Flats, 20, i, 1928 (G.E.H.).

Athlone, Cape Flats, pools near sewage farm, 9, iv, 1927 (L.M.S.)

Durbanville, Cape Flats, 30, iv, 1927 (G.E.H.).

Swellendam, dams, 16–17, xii, 1927 (G.E.H.).

George, dam, 26, xii, 1927 (G.E.H.).

Knysna, pond and slow stream, 20–21, xii, 1927 (G.E.H.).

Assegaibosch, dam, 13, i, 1927 (G.E.H.).

Kimberley, 1, vi, 1912 (S.A.M., Power).

Potfontein, 3, vi, 1927 (L.M.S.).
Klober, Setagoli dist., dam, i, 1927 (Miss B. P. Lamb).
Stormberg, Albert dist., dam, 28, iv, 1928 (G.E.P.).
Dordrecht, Wodehouse dist., 30, iv, 1928 (G.E.P.).
Buffelsfontein, Wodehouse dist., 29, iv, 1928 (G.E.P.).

ORANGE FREE STATE.
Orangia, Smithfield, 1910 (S.A.M., Kannemeyer).

TRANSVAAL.
Christiana (Wallengren type).
Avenue, Boksburg dist., pan, 6, v, 1928 (G.E.H.).
Reitfontein, Boksburg dist., large pan, 27, iv, 1928 (G.E.H.).
Breyten, pan at Bothasrust, 27, ii, 1928 (G.E.H.).
Rooiplatt, Pretoria dist., 20–23, ii, 1920 (Dr. Breyer, T.M.).
Lake Chrissie, dead ♀ on shore, 25, ii, 1928 (G.E.H.); 1 ♀, shallow water, north end, 19, v, 1928 (G.E.P.).
Pan 3, Lake Banagher, near Lake Chrissie, Ermelo dist., 18, v, 1928 (G.E.H.).

This species appears to be confined to the western and central parts of South Africa. It is found living, as at Rondevlei and Pan 3, Lake Banagher, in waters far more salt than recorded for any other South African species. While the specimens from the former locality are normal, 2 ♂♂ and 2 ♀♀, from the latter pan, which is less salt, are very small (♂, 5·8 mm.; ♀, 6·1 mm.).

3. *Sigara* (*S.*) *contortuplicata* (Kirk.).

Corixa contortuplicata	Kirkaldy, 1908, Entom., 41, p. 15.
Corisa irrorata	Fieber, 1851, Abh. Böhm. Ges. Wiss., v, p. 52; *nec* H.S. 1850 (*fide* Kirkaldy).
,, ,,	Wallengren, 1875, Oefv. Ak. For., xxxiii, p. 135.
Arctocorisa hieroglyphica	Hesse, 1925, Ann. S.Afr. M., xxiii, p. 137.

Head yellow to brown; pronotum black with eight pale lines slightly split, anastomosing, or broken; elytra with clavus black with yellow transverse lines, which are entire anteriorly and very fragmented posteriorly; corium with yellow fragmented vermiculate markings, the black breaks forming a longitudinal line near the internal angle, which is black; membrane suture very narrowly brownish, right membrane dark with vermiculate yellow markings, left membrane less dark in its externo-basal half, fading to milky in its interno-apical half.

Head obtusely rounded anteriorly, slightly but definitely produced backward in the mid-dorsal line.

Pronotum $1\frac{1}{5}$ times as wide as long, rounded posteriorly, lateral angles obtuse, median longitudinal carina well marked in the anterior third, hardly traceable posteriorly, rastrate.

Elytra with a vestiture of sparsely placed short hairs ; clavus with faint indications of rastration, which is absent from the corium.

Xyphus subequilateral and somewhat rounded apically. (Plate XXXVIII, fig. 3*b*.)

Intermediate leg with tarsus rather shorter than the claws, which are rather shorter than the tibia.

Posterior femur dorsally with a little pubescence in the anterior part of its base and with a row of about seven short spines near the posterior border distally ; anterior border with three spines distally ; posterior border with a row of about four spines and long hairs subapically ; ventrally with proximal pubescent area reaching the middle in the mid-line and with scattered spines distally that tend to form a median row. (Plate XXXIX, fig. 3.)

♂. Facial impression fairly deep, wide, extending up between the eyes with a small carinate tubercle in the middle of the anterior margin. (Plate XXXVIII, fig. 3, and Plate XXXIX, fig. 6.)

Pala cultrate, slightly bent forward about $\frac{1}{3}$ from the apex, with a single row of about twenty-two pegs. (Plate XXXIX, fig. 9.)

Anterior trochanter with a small pencil of elongate thickened hairs. (Plate XXXIX, fig. 11.)

Strigil irregularly subquadrate with four tooth rows. (Plate XXXVIII, fig. 3*c*.)

Right clasper irregularly semilunate with a subsidiary tooth within the apex. (Plate XXXVIII, fig. 7.)

Length : 5–6 mm.

The above description is based on Transvaal specimens. Fieber's type of *irrorata* must have been much paler, and was probably teneral. He describes the pronotum as having eight brown lines, and the general colour as white with brown markings. The only specimen which approaches this condition in the material before me is one from Henkries, Bushmanland, but the size, disposition of the markings, and locality, "Promontorium Bonae Spei," though somewhat vague, lead me to believe that the species here described is rightly named.

The colour is exceedingly variable. Some of my darkest specimens are from the Cape Flats. In a series from Crawford Vlei nearly all have the ground colour deep black and show a considerable reduction of the dark yellow markings on the corium, while the yellow lines of the pronotum are about $\frac{1}{2}$ as wide as the dark intervening ones. Among several dark specimens from a pool near Princess Vlei is a single female in which the pale and dark bands of the pronotum are subequal in width, the ground colour dark brown, and the markings pale greyish-yellow. Similar though less marked extremes occur in a series from Swellendam. Variation in black pigmentation is found in many European species of *Corixidae*, and is probably due to environmental influences (Hutchinson, Hemiptera-Heteroptera, pt. i, Fauna of Wicken Fen, iii, Cambridge, 1926, pp. 249–251). The occurrence of extremes in the same series may be due to migration of certain individuals from one piece of water to another.

The specimen from South-West Africa recorded by Hesse as *hieroglyphica* is a teneral female, but appears to belong to this species. I know of no evidence that *A. hieroglyphica* Duf. occurs in Ethiopian Africa.

CAPE.

Constantia Nek, 15, xi, 1927 (L.M.S.).
Princess Vlei, Cape Flats, 12, i, 1926 (G.E.P.).
Crawford Vlei, Cape Flats, 26, i, 1926 (G.E.P.).
Frazerdale, Mowbray, Cape Flats, 19, ix, 1927 (L.M.S.).
Durbanville, Cape Flats, 30, iv, 1927 (L.M.S.).
Du Toit's Kloof, 16, iv, 1927 (L.M.S.).
Wellington, ponds, 15, v, 1927 (L.M.S.).
Ceres, pond, 6, xii, 1927 (L.M.S.).
Swellendam, dams, 17, xii, 1927 (G.E.H.).
George, dams, 26, i, 1927 (G.E.H.).
Knysna, stream and pond, 20–24, xii, 1927 (G.E.H.).
Avontuur, pond, 6, i, 1927 (G.E.H.).
Buffelsfontein, Wodehouse dist., 29, iv, 1928 (G.E.P.).
Alice, vlei at S.A.N.C. farm, 24, ii, 1927 (G.E.P.).
Pirie Mission, pool, 2, iii, 1926 (G.E.P.).
Kimberley, 1, vi, 1912 (S.A.M., Power).
Klober, Setagoli dist., dam, i, 1927 (Miss B. Lamb).
Henkries, Bushmanland, x, 1911 (S.A.M., Lightfoot).

ORANGE FREE STATE.

Aliwal North, small dam on north bank of Orange River, Rouxville dist., 5, v, 1928 (G.E.P.).

TRANSVAAL.

Christiana (Wallengren).
Koster, x, 1924 (G. van Dam, T.M.).
Randfontein, 2, iii, 1926 (G.E.H.).
Florida, 14, viii, 1926 (G.E.H.).
Wemmer Pan, near Johannesburg, 31, vii, 1926 (G.E.H.).
Rietfontein, Boksburg dist., 27, iv, 1928 (G.E.H.).
Avenue, Boksburg dist., pan, 6, v, 1928 (G.E.H.).
Moordrift, Waterberg dist., 1, x, 1924 (G. van Dam, T.M.).
Limpopo River, pool in bed, Main Drift near Messina, 28, v, 1927 (G.E.H.).

SOUTH-WEST AFRICA.

♀, Narelis, Damaraland (Hesse, *l.c.*).

This species appears to be confined to South Africa, where it is widely distributed.

4. *Sigara* (*S.*) *ceres* n. sp.

Pronotum brownish-black with seven pale transverse lines, the posterior one short and inconspicuous, entire, and with little or no branching or coalescence; elytra brownish-black, clavus with transverse yellow markings, which are entire in the anterior angle but very fragmented on the disc and posteriorly; corium with fragmented transverse pale lines, the dark breaks forming an indefinite longitudinal line near the outer margin and another near the internal angle, which is itself dark, the fragmentation otherwise irregular; cuneus dark with yellow markings, right membrane blackish-brown with vermiculate fragmented transverse yellow lines, left membrane in its external part like the right but paler, fading to milky white on the interno-apical lobe; thorax and abdomen beneath yellowish, abdomen of the male with greyish-black clouding, save on the margins of the segments.

Head obtusely rounded in front.

Pronotum about $1\frac{3}{5}$ times as broad as long, with the lateral angles obtusely rounded, the median longitudinal carina conspicuous anteriorly and just traceable throughout, rastrate.

Elytra not rastrate, with a sparse but conspicuous vestiture of short hairs.

Xyphus subequilateral, rounded apically. (Plate XXXVIII, fig. 4*b*.)

Intermediate leg with tibia and claws subequal, tarsus just over $\frac{5}{7}$ as long as the latter (♂, 17 : 12·5 : 17 ; ♀, 17 : 13·5 : 18).

Posterior femur dorsally, with a subtransverse row of hairs basally and two small spines in the distal region; anterior margin with three well-developed spines distally; posterior region with a row of three spines and long hairs subapically; ventrally with proximal pubescent area reaching well beyond the middle in the mid-line and with a few scattered spines in the glabrous distal region. (Plate XXXIX, fig. 4.)

Facial impression wide but not very deep, reaching up between the eyes, but without a knob or carina on its anterior margin. (Plate XXXVIII, fig. 4*a*.)

♂. Pala cultrate and slightly arched, with a single row of twenty-two pegs. (Plate XXXIX, fig. 10.)

Anterior trochanter without a hair pencil.

Strigil irregularly ovoid with six rows of plates. (Plate XXXVIII, fig. 4*c*.)

Right clasper dilated before the apex and with a very large tooth just below the dilation. (Plate XXXVIII, fig. 8.)

♀. Pala cultrate and slightly arched.

Length: ♂, 4·5 mm.
♀, 5·0 mm.

♂, ♀ (*type* and *allotype*), Laaken Vallei, Matroosberg, 3500 ft., Ceres div., i, 1917 (S.A.M., Lightfoot).

Superficially this species might be mistaken for *contortuplicata*, but beside the secondary sexual differences given above it is recognisable by its smaller size and seven pronotal lines. It appears to be a very local insect; I was unable to find it either at Ceres or in the mountains west of Mitchell's Pass.

III.—ZOOGEOGRAPHY.

Though the two families which form the subject of this paper are relatively small and somewhat arbitrarily associated in its title, certain facts of interest emerge from a study of the distribution of their component species. For the purpose of such a study we may group these species as follows:—

1. *Pan-Ethiopian.*

Species occurring throughout the whole of South Africa and also known and probably widespread in Central Africa.

Enithares sobria Stål.
Anisops (*A.*) *varia* Fieb.

Plea pullula Stål.
Micronecta scutellaris Stål.
Micronecta piccanin n. sp.*
Sigara (S.) sjöstedti Kirk.

2. *Central African.*

Species occurring in Central Africa and reaching to various latitudes in South Africa, but not inhabiting the south-west part of the Cape Province. The localities give the known limits southward and westward of each species.

Enithares v-flavum Reut., South Transvaal; East Cape.

Enithares chinai Jacz., East Transvaal; East Cape. (Plate XL, map 1.)

Anisops (A.) sardea H.S., South Transvaal; West Cape to Victoria West; South-West Africa. (Plate XL, map 2.)

Anisops (A.) pellucens Gerst., Southern Rhodesia.

Anisops (A.) debilis Gerst., North Transvaal; East Cape. (Plate XL, map 3.)

Anisops (A.) psyche Hutch., North Transvaal.

Anisops (A.) jaczewskii Hutch., North Transvaal.

Anisops (Micranisops) apicalis Stål, Southern Rhodesia; ? Natal.

Nychia limpida Stål, Southern Transvaal; Cape west to Swellendam. (Plate XL, map 4.)

Agraptocorixa swierstrai n. sp., Portuguese East Africa.

3. *South African Endemics.*

Species recorded only from south of the Limpopo and often with a restricted range. Some of these may have to be transferred to other sections as knowledge of their distribution increases.

Anisops (A.) letitia n. sp., East Cape.

Anisops (A.) poweri n. sp., Cape; South Transvaal. (Plate XL, map 5.)

Anisops (A.) hypatia n. sp., West Cape. (Plate XL, map 3.)

Anisops (Anisopoides) aglaia n. sp., Cape; South Transvaal. (Plate XL, map 5.)

Plea piccanina n. sp., Cape.

Sigara (S.) meridionalis Wallgr., Cape; Orange Free State; South Transvaal. (Plate XL, map 5.)

Sigara (S.) contortuplicata Kirk., Cape; Transvaal; ranges into S.W.A.

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* An Abyssinian record of this species will be given in another place.

Sigara (*S.*) *ceres* n. sp., West Cape.

Micronecta dorothea n. sp., South Transvaal.

Micronecta winifreda n. sp., West Cape.

Micronecta gorogaiqua n. sp., West Cape.

Micronecta butleriana n. sp., East Cape.

Micronecta citharistia n. sp., South Transvaal and East Cape. (Plate XL, map 5.)

Micronecta youngiana n. sp., East Transvaal.

4. *Generally distributed South African Species not hitherto found North of the Zambesi.*

Anisops (*A.*) *gracilis* n. sp., Cape; Transvaal and Southern Rhodesia.

5. *Rhodesian.*

Species occurring in Rhodesia, Bechuanaland Protectorate, South-West Africa, parts of the Transvaal, etc., but not yet recorded from Central Africa.

Anisops (*A.*) *leesoniana* n. sp., Southern Rhodesia.

Anisops (*A.*) *praetexta* n. sp., Southern Rhodesia; North Transvaal.

Micronecta druryiana n. sp., Upper Zambesi and Linyanti Rivers.

Micronecta bleekiana n. sp., Linyanti River; Southern Rhodesia; North Transvaal.

Micronecta monomatapae n. sp., Southern Rhodesia.

Micronecta uvarovi Jacz., Southern Rhodesia; Natal.

Micronecta browni n. sp., Southern Rhodesia; West Transvaal; and South-West Africa.

Micronecta quewalepele n. sp., Linyanti River.

Micronecta simillima n. sp., Southern Rhodesia and Linyanti River.

The South-West African species *Micronecta hessei* n. sp. belongs to a similar geographical category.

6. *Species occurring in West Tropical Africa and South-West Cape.*

Notonecta lactitans Kirk. (Plate XL, map 6.)

An examination of the number of species occurring in circumscribed and tolerably well-worked areas throughout Africa suggests very strongly that the genus *Anisops* has its headquarters in Central Africa.

	Kampala. Uganda. (G. L. R. Hancock.)	S. Rhodesia.	N. Trans-vaal.	S. Trans-vaal.	E. Cape.	W. Cape.
A. sardea .	+	+	+	+	—	+
A. pellucens .	+	+	—	—	+	—
A. letitia .	—	—	—	—	+	—
A. debilis .	+	+	+	—	+	—
A. leesoniana	—	+	—	—	—	—
A. poweri .	—	—	—	+	+	+
A. gracilis .	—	+	+	+	+	+
A. hancocki .	+	—	—	—	—	—
A. ares . .	+	—	—	—	—	—
A. varia .	—	+	+	+	+	+
A. hypatia .	—	—	—	—	—	+
A. praetexta .	—	+	+	—	—	—
A. eros . .	+	—	—	—	—	—
A. kampalensis	+	—	—	—	—	—
A. psyche .	+	+	+	—	—	—
A jaczewskii .	—	—	+	—	—	—
A. adonis .	+	—	—	—	—	—
A. (*Aoid.*) *aglaia*	—	—	—	+	+	+
A. (*M.*) *apicalis*	+	+	—	—	—	—
No. of species	10	9	7	5	6	6

It is, moreover, very doubtful if any other part of the world can boast as many species as the country round Kampala investigated by Mr. Hancock.

This Central African assemblage contains a mixture of primitive and specialised forms and may well be the cradle of the majority of the modern representatives of the genus. Unfortunately in the case of the other genera so few species are known, and so little work has been done on Central African forms, that such an analysis is quite impossible.

If we consider the species grouped as Central African, we find that they have reached very different points in a hypothetical dispersal from the central part of the Continent. An examination, moreover, of the distributions of some of the better known species indicates that foremost colonisation has proceeded more rapidly along a coastal belt than across the interior of the country.* The beginning of such an invasion is perhaps shown by *Agraptocorixa swierstrai*, a species which, though not actually known from Central Africa, belongs to a typically Central African genus. Later stages in the spread of water-bugs into South Africa are illustrated by *Enithares chinai* (Plate XL, map 1); *Anisops debilis* (Plate XL, map 3); and *Nychia limpida* (Plate XL, map 4). In all probability the species grouped as Pan-African may be regarded as Central African species that have completed their southward dispersal. The coastal route that the majority have taken is perhaps determined by the lower rainfall, perhaps by the lower temperature of the interior (*vide infra*). On the whole, the latter explanation seems more probable, for in the temperate South-Eastern Transvaal, which should not be far from the migration route, are a number of " pans " containing fairly permanent water, but possessing an essentially South rather than a Central African assemblage of water-bugs (*A. varia*, *A.* (*Aoid.*) *aglaia*, *S. meridionalis*, and *M. scutellaris*).

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* *Cf.* Hewitt, J., "Facts and Theories on the Distribution of Scorpions in South Africa," Trans. Roy. Soc. S. Afr., xii, p. 249, 1924.

There is some indication that two species are invading South Africa from the west. These are *Anisops sardea* (Plate XL, map 2), a widespread Ethiopian, Mediterranean, and West Asiatic form, and *Micronecta browni*, so far known only from South-West Africa, South Rhodesia, and West Transvaal.

Of the endemic South African species none show any Australasian affinities, nor are they a markedly primitive assemblage. Only one quite peculiar form occurs, viz. *Anisops* (*Anisopoides*) *aglaia*. The most remarkable distribution found among the South-West Cape forms is undoubtedly that of *Notonecta lactitans*, the discontinuity of which has been discussed in detail (p. 366). *A. gracilis* is perhaps an endemic South African form now spreading northward; more probably it has been overlooked in Central Africa. The Neotropical affinities of all the Ethiopian species of *Sigara* have already been emphasised.

IV.—ECOLOGY.

1. Rainfall and Colonisation.

South Africa is a dry country, more than half of the area under consideration having a rainfall less than 20 inches per annum. Moreover, nearly the whole country has its rain very unevenly distributed throughout the year and prolonged droughts are frequent. The life of any animal inhabiting fresh waters is, therefore, precarious, and we have no evidence that the water-bugs of the two families under consideration have any means of withstanding the drying up of their habitat, save that of taking to their wings when these are fully developed. The chief natural aquatic habitats of the country are provided by, on the one hand, rivers and streams, and the pools left in their courses when they dry up in winter; and, on the other, by vleis and pans. These latter are large depressions temporarily or permanently filled with water which occur in some areas (Cape Flats, West Transvaal, and North-West Orange Free State, East Transvaal) and are probably the result of wind erosion.

Four endemic species, viz. *Anisops* (*A.*) *poweri*, *Anisops* (*Aoid.*) *aglaia*, *Sigara* (*S.*) *meridionalis*, and *Micronecta citharistia*, seem characteristic of the drier central part of South Africa. All occupy much the same territory, which has for the most part a rainfall of under 30 inches per annum (Plate XL, fig. 5). *M. citharistia*, however, only occurs in the eastern part of this area. *A.* (*Aoid.*) *aglaia* and *S.* (*S.*) *meridionalis* are essentially pan species (Plate XLI, fig. 4), also occurring now in dams; the other two naturally occur in pools in streams. (Plate XLI, fig. 5.)

Since the European colonisation of the country, natural habitats have been greatly supplemented by dams and reservoirs, so that in the place of irregular streams and pools we have now large bodies of standing permanent water. The importance of such constructions in opening up the country to water-bugs as well as civilised man is shown by the fact that, of the localities enumerated in this paper, no less than 38, or 36·2 per cent., are artificial. This proportion would be greatly increased if more localities in the Karroo and other very dry areas had been examined. It is not improbable that the distribution of several species (e.g. *Nychia limpida*, of which the most westerly record in the Cape is a single macropterous ♂ from a dam at Swellendam) may have been facilitated in this way, and changes may be expected to occur in the future. The construction of roads necessitating "drifts" in rivers (Plate XLI, fig. 8) has also helped to produce many shallow, less swiftly flowing reaches, very much favoured by *Micronectae*, especially *M. scutellaris*.

2. Standing and Running Water.

While the majority of species for which adequate data exists seem to occur both in standing water and in pools and more slowly moving parts of streams, two have only been taken in entirely standing water:

A. (*Aoid.*) *aglaia*,
Micronecta dorothea,

and a third, *S.* (*S.*) *meridionalis*, is almost confined to such.

On the whole, standing water appears to offer a better medium than flowing, but a few species are usually associated with the latter. In the forefront of these we have the genus *Enithares* of which *v-flavum* and *chinai* are usually, and *sobria* frequently, taken in the backwaters and slower flowing parts of streams and rivers (Plate XLI, fig. 7). A typical habitat of *E. v-flavum* and *E. sobria* is also shown in the photograph of the bank of the stream in Witpoortje Kloof, near Johannesburg (Plate XLI, fig. 4), where these two species were associated with *Anisops varia scutellata. Nychia limpida*, moreover, is frequently a denizen of running water. An interesting example of the partition of species between moving and standing water was afforded by the Limpopo River and the pools in its flood-bed near Messina. Two localities were visited. At one of these, known as the Gorge (Plate XLI, fig. 2), the river passes through a rocky channel opening out lower down. In the quieter parts of the river in this channel *Nychia l. limpida* was common, and quite a number of macropterous specimens were taken. Since this form is very rare in collections, but three examples being recorded in the literature, one cannot but suppose that it was unusually abundant here, as in certain other South African stations (*vide supra*). Since the river suffers immense annual changes and in summer is a raging torrent rising above the rocky banks seen in the photograph, it is probable that many of the *Nychiae* perish, and those which have wings would have, theoretically at least, a chance of reaching some of the pools found in the surrounding district in the rainy season. Some such consideration may perhaps explain the apparently unusual abundance of the very rare macropterous form in South Africa. *Anisops sardea* also occurred in this locality sporadically, and just below where the river widened somewhat a small colony of *A. debilis* was discovered much closer in to the shelter of the bank than the *Nychiae*.

Some miles lower down, where the river-bed spreads out into a band of sand half a mile broad (Plate XLI, fig. 1), through which flows an irregular shallow stream, different conditions obtained. In parts of the stream itself *E. chinai* occurred, while in shallow, recently formed pools *Micronecta bleekiana* was common. The most remarkable assemblage of forms, however, was found in a small pool, not 15 feet across, which had formed round a large boulder. A small tree growing in the sand not far off indicated that this part of the flood-bed, though in the very middle, had been undisturbed for some months. The following species occurred in this pool :

Enithares chinai.
Anisops sardea.
Anisops debilis.
Anisops gracilis.
Anisops varia scutellata.
Anisops jaczewskii.
Micronecta perdita.
Micronecta bleekiana.
Ranatra sp.
Belostomid nymphs.

The majority of the specimens of *Anisops* were taken under the shade of the boulder. The *Ranatra* was taken on a small dead bush that had been washed into the pool.

The colonisation of new localities is effected with remarkable rapidity. A large pan at Rietfontein, which had remained dry for some years, filled up in December 1927 and January 1928. By April 1928 large numbers of water-bugs, many newly emerged and teneral, were found, comprising the following :

A. (*A.*) *sardea.*
A. (*A.*) *varia.*
A. (*Aoid.*) *aglaia.*
S. (*S.*) *contortuplicata.*
S. (*S.*) *meridionalis.*
M. scutellaris.

Of these species *Anisops* (*A.*) *sardea* occurs in pans at Brakpan, and *Anisops* (*Aoid.*) *aglaia* is otherwise known in the Witwatersrand area on single specimen. The bugs were swimming mostly in small areas of clear water between the derelict terrestial plants, in which an aquatic vegetation is springing up (Plate XLI, fig. 3). Few were found in the central open pool, where the water is somewhat deeper.

3. TEMPERATURE.

Conditions in Central and South Africa probably differ more in temperature than in any other way. The surface temperature of Tanganyika is stated to be about 26° C. (Esaki and China, Tr. Ent. Soc., l, 1927, p. 292). Smaller bodies of water in this latitude must regularly reach higher temperatures. The maximum temperature reached by the surface water of Florida Lake, a small artificial body of water near Johannesburg, in the summer 1927–28 was 22·5° (Miss J. F. M. Schuurman, *unpublished observations*), while, according to

Barnard, the very shallow waters in which *Phreatoicus capensis* lives on Table Mountain vary from 7° C. (July) to 20° C. (January).[*] My own observations, made sporadically, fall within these limits, but in a pool near Princess Vlei *Plea piccanina* and *Sigara* (*S.*) *contortuplicata* were taken in water at about blood temperature (12, i, 1926, G.E.P.).

The following observations on the fauna of the baths at the hot springs at Aliwal North are not without interest in this connection (30, iv, 1928, G.E.P., notebook).

" There are three hot baths of gradually decreasing temperature and a fourth small shallow pool for children to paddle in.

" (1) Where spring emerges, surrounded on three sides by reeds, very deep. Temperature just under 34° C. (said to be 95° F.=35° C. at source of spring) ; Ph between 8·4 and 8·6. Much whitish slimy growth round edges. No apparent life except one small water-beetle.

" (2) Lower rectangular cement-sided bathing-pool with diving boards, etc. Temperature 32° C. ; Ph not taken. *Chironomus* larvae in mud and slime, a few *Micronecta scutellaris,* but no other bugs, and I was unable to find any beetles.

" (3) Lowest bathing-pool also rectangular and with diving boards —on surface numerous large gyrinids, in water *Micronecta scutellaris* and *Anisops varia,* the latter in swarms in a shaded corner by steps, but also in sun. A large water-beetle ; I did not catch any smaller ones, however ; *Chironomus* larvae. Temperature, 29·5° C. ; Ph=C. 8·5°.

" (4) Small shallow paddling pool, *Gerris* and gyrinids at surface, *Anisops varia,* a small water-beetle, numerous aeschnid dragonfly larvae, *Chironomus* larvae. I was unable to catch any *Micronecta scutellaris,* but they doubtless occurred; said to be frogs. Temperature 20° C."

An analysis of the water has been published (Hahn in South and East African Year Book and Guide, 1926, p. 541), here converted from grains per gallon to grams per litre.

Li_2CO_3	·012	grm. per litre.
$CaCO_3$	·106	,, ,,
$MgSO_4$	·028	,, ,,
NH_3	·044	,, ,,
K_2CO_3	·013	,, ,,
$CaCl_2$	·116	,, ,,
NaCl	·875	,, ,,
SiO_2	·015	,, ,,
NaBr	·0017	,, ,,
CO_2	·074	,, ,,

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[*] Trans. Roy. Soc. S. Afr., xiv, p. 203, 1927.

The great contrast between the faunae of 2nd and 3rd of the pools appears to be due to temperature, as they were extremely similar in every way. It would appear that *Anisops varia scutellata* is unable to live permanently in water at 32° C., and *Micronecta scutellaris* at 34° C. A sample from (3) was found to be ·019 N for chloride, the above analysis giving ·017 N, so dilution does not seem to have occurred.

If these temperatures are really the upper limits in nature of the species in question, they are remarkably low. Plateau (*vide* Brues, Animal Life in Hot Springs, Quart. Rev. Biol., ii, 2, p. 189) states that at Vichy *Notonecta glauca* and *Nepa cinerea* occur at 45° C., though in the laboratory the upper limits for the two species were 37·5° C. and 43° C. respectively.

4. ILLUMINATION.

While, in general, species of *Anisops* are found in shady places, specimens of *Anisops varia scutellata*, of which this is certainly true, were not found to be negatively phototropic in the laboratory. Both *Anisops varia scutellata* and *Sigara contortuplicata*, when illuminated with a strong electric light, may react by leaving the water and flying off in the direction of the light. In an experiment with these two species eight specimens of the latter left the dish and flew directly to the light in a very short time of each other. The specimens of *varia* reacted more slowly, and of the three one failed to leave the water at all. The reaction is not simply a tropism directing the line of movement of the insect, but a complex reflex involving leaving the water and spreading the wings. In *Anisops*, moreover, the whole body has to be turned over before the insect can emerge dorsal side uppermost.

Large migrations of water-bugs have been frequently recorded, but this incidence is so far unexplained. The behaviour of the specimens of *Sigara contortuplicata* recorded above can only be compared to such a migration on a small scale, and in all probability unusually intense sunlight is the stimulus for such migrations. The apparent negative phototropism of *Anisops* spp. in nature may perhaps be explained by movement into cold from warmer water ; experimental investigation of this subject would be interesting.*

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* Poisson (C. R. Assoc. Fr. Av. Sci. ; Liége, 1924, p. 985), however, states that increase in temperature is a cause of flight and gives interesting threshold temperatures. He also notes that these insects fly on warm thunderous evenings, and attributes this to the electrical condition of the atmosphere. In my experiments practically no increase in temperature occurred.

5. CHEMICAL COMPOSITION.

The following data, collected for purposes outside the present work, may be usefully tabulated here. The extreme range of hydrogen-ion concentration, roughly determined colorimetrically, and of salinity determined by titration with $AgNO_3$, is given for all species for which determinations exist.

Species.	Ph Range.	Salinity Range (normality).
N. lactitans	Table Mt. 4·9, Cape Flats 8·9.	
E. sobria	Witpoortje 7·0	Witpoortje *traces.*
E. v-flavum	Witpoortje 7·0	Witpoortje *traces.*
A. sardea	Rietfontein 7·1	Rietfontein ·0004 N.
A. gracilis	Birchleigh 7·0, Barberspan 9·2	Birchleigh ·000125 N, Barberspan ·0106 N.
A. varia scutellata	Wemmer Pan 4·0, Blaauwwater 9·2	Rietfontein ·0004 N, Blaauwwater ·021 N.
A. aglaia	Table Mt. 5·9, Blaauwwater 9·2	Table Mt. *traces*, Blaauwwater ·021 N.
P. pullula	Brakpan 7·1, Goedeverwachting 8·2	Brakpan ·00175 N, Goedeverwachting ·0234 N.
M. scutellaris	Knoffelspruit 6·9, L. Chrissie 9·2	Birchleigh ·000125 N, L. Chrissie ·01.
M. dorothea	Birchleigh 7·0, Grassdale 8·6	Birchleigh ·000125 N, Grassdale ·010.
M. gorogaiqua	Knoffelspruit 6·9, Diepkloof 8·9	
M. citharistia.	Knoffelspruit 6·9, Diepkloof 8·9	
M. browni	Barberspan 9·2	Barberspan ·0106 N.
S. sjöstedti	Pool near L. Chrissie 7·0.	Pool, L. Chrissie ·0005 N.
S. meridionalis	Rietfontein 7·1, Pan 3, L. Banagher 9·1	Rietfontein ·0004 N, Rondevlei ·416 N.
S. contortuplicata	Wemmer Pan 4·0, Breyten 8·8.	Rietfontein ·0004, Breyten ·001 N.

The wide range of hydrogen-ion concentration tolerated by many species is most striking. The scanty data forthcoming suggest that it is on the acid rather than the alkaline side that any restriction by this factor should be sought for. Several species, however, *N. lactitans*, *A. varia scutellata*, *A. aglaia*, and *S. contortuplicata*, occur in water whose Ph is less than 6·0, and the first and fourth of these occur at the edge of the Wemmer Pan where Ph=4·0. This body of water is polluted by mining operations, being rich in sulphate from the decomposition of sulphides on the mine dumps around. The acidity is probably due to $NaHSO_4$. The central part of the Pan has the Ph of 3·4 and is practically devoid of any life ; at the edge, where surface waters dilute those of the Pan, are found these bugs and dragonfly and dipterous larvae. *M. scutellaris* formerly occurred.

but has now (May 1928) disappeared; unfortunately the Ph was not determined when this species was found. *N. lactitans* must travel in the Cape from acid water to alkaline, from very fresh to somewhat more salt. All the Cape vleis are highly alkaline (Professor L. T. Hogben, *private communication*); unfortunately no data exist for the localities in which this species breeds. *S. meridionalis* is the only species which lives in water of which the chloride content is really high (L. Banagher, pan 3, ·235 N., Ronde Vlei, ·416 N.), none of the other species occurring in water much more than $\frac{1}{50}$ normal. It must be remembered, however, that many of these alkaline and slightly salt waters have a high bicarbonate content, so that the osmotic pressure is higher than the Cl content suggests. A more extended study of the animal ecology of these localities is in preparation. Poisson* has shown that *S. lugubris* Fieb., *N. viridis* Delc., etc., in Europe occur in brackish water, because in these species the egg is able to hatch in fairly high concentrations of salt. Investigation with *S. meridionalis* might yield similar results.

6. Vegetation.

The depth of a pond is a matter of considerable importance to the *Corixidae*, for being insects which live habitually on a solid substratum rather than poised in the water as does *Anisops*, or at the surface like *Notonecta* or *Enithares*, the distance to be traversed to obtain a new supply of oxygen is a matter of some importance.

As I have pointed out elsewhere (Nat. Hist. Wicken Fen., vol. iii, p. 248, Cambridge, 1926), the presence of weeds in a pool may provide a sort of false bottom on which numerous individuals of this family can live. Lake Chrissie provides a striking example of this. *A.* (*Aoid.*) *aglaia* and *Micronecta scutellaris* occurred not at the windswept and exposed shore, nor in the open water in the centre of the lake, but living in a dense zone of *Potamogeton* growing in about 5–10 feet of water some distance from the margin. Here these insects would have an abundant food-supply, shelter in storms, and, for *M. scutellaris*, a substratum within easy reach of the atmospheric air. On the whole, large lakes, unless supplied with quiet inlets or, as in this case, abundance of vegetation, are unsuitable for water-bugs. It is interesting to note that the only bugs inhabiting fresh waters which can be legitimately called "oceanic" are the two genera *Idiocoris* and *Paskia* described by Esaki and China from Tanganyika (*l.c.*), in which the spiracles are closed and respiration of dissolved oxygen presumably occurs.

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* C. R. Assoc. Fr. Av. Sci.; Liége, 1924, p. 983.

Though the presence of weed may make certain otherwise impossible localities habitable, the South African species of both *Notonectidae* and *Corixidae* are most usually found in small pieces of open water, large masses of water plants impoverishing the fauna. Exceptions to this rule are the two species of *Plea* which, unlike the other *Notonectidae,* appear to live climbing on weed and swimming about among it, and *Micronecta dorothea,* which at Birchleigh dam (Plate XLI, fig. 6) was found almost exclusively in dense *Potamogeton,* while *Micronecta scutellaris* here occurred in open water between reeds.

7. CONCLUSION.

While a number of the more important ecological factors which might determine the existence of any given species in a locality have been reviewed, none throw very much light on the matter. Possibly this is because the effect of different organisms, and especially the members of the water-bug population, on each other has not been studied. Very little, for instance, is known about the food-cycles of the *Notonectidae* and *Corixidae.* The latter are said to be microphagous by Hungerford, and to eat mosquito larvae, etc., by Hale. The former are certainly predatory ; I have observed the species of *Anisops* found at Rietfontein feeding on a large Ostracod which is plentiful in shallow water among vegetation. Still less is known about the animals which feed on these insects. Butler refers to a bittern, in the stomach of which were found entire specimens of *Notonecta glauca* (Biol. Brit. Hemip. Het., London, 1923, p. 562) ; possibly *N. lactitans* is eaten by water-birds at the Cape. *M. browni* probably forms part of the diet of the microphagous flamingoes at Barberspan. If the present study is of assistance in elucidating such ecological problems by future students its purpose will have been fulfilled.

V.—EXPLANATION OF PLATES.

Plate XXVII.

FIG.
1. *Notonecta* (*Paranecta*) *lactitans* Kirk. Head and pronotum.
2. ,, ,, ,, ,, Apex of intermediate femur.
3. ,, ,, ,, ,, Wing.
4. *Enithares chinai* Jacz. Head and pronotum.
5. ,, *sobria* Stål. Wing.
6. ,, ,, ,, Anterior leg of ♂.

Plate XXVIII.

1. *Notonecta* (*P.*) *lactitans* Kirk. ♂ genital capsule.
2. ,, ,, ,, ,, ♂ aedeagus ; *s.* internal stay.
3. ,, ,, ,, ,, ♂ paramere.
4. *Enithares chinai* Jacz. ♂ genital capsule.
5. ,, ,, ,, ♂ paramere.
6. ,, *sobria* Stål. ♂ genital capsule.
7. ,, ,, ,, ♂ paramere.
8. *Enithares v-flavum* Reut. ♂ genital capsule.
9. ,, ,, ,, ♂ paramere.

Plate XXIX.

1. *Anisops* (*A.*) *sardea* H.S. ♂ head and pronotum.
2. ,, ,, *pellucens* Gerst. ♀ head and pronotum.
3. ,, ,, *letitia* n. sp. ♂ head and pronotum.
4. ,, (*Anisopoides*) *aglaia* n. sp. ♂ rostrum.
5. ,, (*Micranisops*) *apicalis* Stål. Elytron (right).
6. *Nychia limpida limpida*, form *sappho* Kirk. ♀ elytron (left).
7. ,, ,, ,, Stål. Head and pronotum.
8. ,, ,, ,, ,, Wing.
9. *Anisops* (*A.*) *varia scutellata* Fieb. Wing.
10. *Notonecta lactitans* Kirk., Nymph, ?3rd instar ; head and prothorax.
11. ,, ,, ,, ,, 5th instar ; head and prothorax.
12. *Enithares sobria* Stål, Nymph, ?5th instar ; head and prothorax.
13. *Anisops* (*A.*) *sardea* H.S. ♂ last instar nymph ; head and prothorax.
14. ,, ,, *gracilis* n. sp. Last instar nymph ; head and prothorax.
15. *Nychia limpida limpida* Stål. Last instar nymph ; head and prothorax.

Plate XXX.

1. *Anisops* (*A.*) *jaczewskii* Hutch. ♂ facial tubercle.
2. ,, ,, *vitrea* Sign. ♂ facial tubercle.
3. ,, ,, *aldabrana* Dist. ♂ facial tubercle.
4. ,, ,, *hancocki* Hutch. ♂ facial tubercle.

FIG.
5. *Anisops* (*A.*) *psyche* Hutch. ♂ facial tubercle.
6. ,, ,, *genji* Hutch. ♂ facial tubercle.
7. ,, ,, *sardea* H.S. ♂ facial tubercle.
8. ,, ,, ,, ,, ♂ facial tubercle.
9. ,, ,, ,, ,, ♂ 3rd rostral joint.
10. ,, ,, *pellucens* Gerst. ♂ 3rd rostral joint.
11. ,, ,, *letitia* n. sp. ♂ 3rd rostral joint.
12. ,, ,, *gracilis* n. sp. ♂ 3rd rostral joint.
13. ,, ,, *poweri* n. sp. ♂ 3rd rostral joint.
14. ,, ,, *leesoniana* n. sp. ♂ 3rd rostral joint.
15. ,, ,, *debilis* Gerst. ♂ 3rd rostral joint.
16. ,, ,, *hypatia* n. sp. ♂ 3rd rostral joint.
17. ,, ,, *varia scutellata* Fieb. ♂ 3rd rostral joint.
18. ,, ,, *jaczewskii* Hutch. ♂ 3rd rostral joint.
19. ,, ,, *praetexta* n. sp. ♂ 3rd rostral joint.
20. ,, ,, *psyche* Hutch. ♂ 3rd rostral joint.
21. ,, (*Micranisops*) *apicalis*. ♂ 3rd rostral joint.

PLATE XXXI.

1. *Anisops* (*A.*) *sardea* H.S. ♂ anterior leg.
2. ,, ,, *pellucens* Gerst. ♂ anterior leg.
3. ,, ,, *letitia* n. sp. ♂ anterior leg.
4. ,, ,, *gracilis* n. sp. ♂ anterior leg.
5. ,, ,, *debilis* Gerst. ♂ anterior leg.
6. ,, ,, *poweri* n. sp. ♂ anterior leg. 6*a* comb.
7. ,, ,, *leesoniana* n. sp. ♂ anterior leg.

PLATE XXXII.

1. *Anisops* (*A.*) *varia scutellata* Fieb. ♂ anterior leg.
2. ,, ,, *hypatia* n. sp. ♂ anterior leg. 2*a* comb.
3. ,, ,, *psyche* Hutch. ♂ anterior leg.
4. ,, ,, *praetexta* n. sp. ♂ anterior leg. 4*a* comb.
5. ,, ,, *jaczewskii* Hutch. ♂ anterior leg.
6. ,, (*Micranisops*) *apicalis* Stål. ♂ anterior leg.
7. ,, (*Anisopoides*) *aglaia* n. sp. ♂ anterior leg. 7*a* comb.
8. ,, (*A.*) *jaczewskii* Hutch. Comb.
9. ,, ,, *amaryllis* Hutch. Comb.
10. ,, ,, *eros* Hutch. Comb.
11. ,, ,, *kampalensis* Hutch. Comb.
12. ,, ,, *gracilis* n. sp. ♀ apex of anterior leg.
13. *Nychia limpida limpida* Stål. ♂ apex of anterior leg.

Plate XXXIII.

r.p.=right paramere ; *l.p.*=left paramere ; *r.a.*=right ala ; *l.a.*=left ala ; *a.i.*=appendix interna ; *a.e.*=appendix externa ; *g.o.*=genital opening.

FIG.
1. *Nychia limpida limpida* Stål. Aedeagus.
2. ,, ,, ,, ,, Genital capsule.
3. ,, ,, ,, ,, Left paramere.
4. ,, ,, ,, ,, Right paramere.
5. *Anisops* (*A.*) *poweri* n. sp. Genital capsule.
6. ,, ,, ,, Aedeagus, antero-lateral aspect.
7. *Plea piccanina* n. sp. Profile of elytron.
8. ,, *pullula* Stål. Profile of elytron.
9. ,, ,, ,, Wing.
10. ,, ,, ,, Genital capsule.
11. ,, ,, ,, Aedeagus.
12. ,, *piccanina* n. sp. Parameres.
13. ,, *pullula* Stål. Parameres.
14. ,, *leachii* M'Gr. and Kirk. Parameres.

Plate XXXIV.

a=free portion of 7th abdominal tergite ; *b*=right paramere ; *c*=left paramere.

1. *Micronecta scutellaris* Stål. ♂ genitalia.
2. ,, *perdita* n. sp. ♂ genitalia.
3. ,, *hessei* n. sp. ♂ genitalia.
4. ,, *gorogaiqua* n. sp. ♂ genitalia.
5. ,, *winifreda* n. sp. ♂ genitalia.
6. ,, *druryana* n. sp. ♂ genitalia.

Plate XXXV.

1. *Micronecta dorothea* n. sp. ♂ genitalia.
2. ,, *butleriana* n. sp. ♂ genitalia.
3. ,, *monomatapae* n. sp. ♂ genitalia.
4. ,, *browni* n. sp. ♂ genitalia.
5. ,, *quewalepele* n. sp. ♂ genitalia.
6. ,, *simillima* n. sp. ♂ genitalia.
7. ,, *bleekiana* n. sp. ♂ genitalia.

Plate XXXVI.

1. *Micronecta citharistia* n. sp. ♂ genitalia.
2. ,, *uvarovi* Jacz. ♂ genitalia.
3. ,, *piccanin* n. sp. ♂ genitalia.
4. ,, *youngiana* n. sp. ♂ genitalia.
5. ,, *piccanin*, form *piccanin* n. Right elytron.
6. ,, *piccanin*, form *pardina* n. Right elytron.
7. ,, *piccanin*, form *tigrina* n. Right elytron.

Plate XXXVII.

FIG.
1. *Micronecta piccanin,* form *audax* n. Right elytron.
2. ,, *piccanin,* form *variegata* n. Right elytron.
3. ,, *piccanin,* form *nigroclavata* n. Right elytron.
4. ,, *piccanin,* form *perversa* n. Right elytron.
5. *Agraptocorixa swierstrai* n. sp. ♂ face.
6. ,, ,, Posterior femur, dorsal view.
7. ,, ,, Posterior femur, ventral view.
8. ,, ,, ♂ pala.
9. ,, ,, ♂ portion of abdomen bearing strigil.
10. ,, ,, ♂ strigil.
11. ,, ,, Xyphus.
12. ,, ,, ♂ right paramere.
13. ,, ,, ♂ left paramere.

Plate XXXVIII.

a=face of ♂; *b*=xyphus; *c*=strigil.

1. *Sigara* (*S.*) *sjöstedti* (Kirk.). *a*, *b*, and *c*.
2. ,, ,, *meridionalis* (Wallgr.). *a*, *b*, and *c*.
3. ,, ,, *contortuplicata* (Kirk.). *a*, *b*, and *c*.
4. ,, ,, *ceres* n. sp. *a*, *b*, and *c*.
5. ,, ,, *sjöstedti* (Kirk.). Parameres.
6. ,, ,, *meridionalis* (Wallgr.). Parameres.
7. ,, ,, *contortuplicata* (Kirk.). Parameres.
8. ,, ,, *ceres* n. sp. Parameres.

Plate XXXIX.

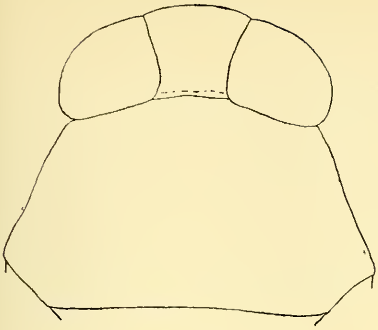
1. *Sigara* (*S.*) *sjöstedti* (Kirk.). Posterior femur, (*a*) dorsal, (*b*) ventral aspect.
2. ,, ,, *meridionalis* (Wallgr.). Posterior femur, (*a*) dorsal, (*b*) ventral aspect.
3. ,, ,, *contortuplicata* (Kirk.). Posterior femur, (*a*) dorsal, (*b*) ventral aspect.
4. ,, ,, *ceres* n. sp. Posterior femur, (*a*) dorsal, (*b*) ventral aspect.
5. ,, ,, *meridionalis* (Wallgr.). ♂ profile of face.
6. ,, ,, *contortuplicata* (Kirk.). ♂ profile of face.
7. ,, ,, *sjöstedti* (Kirk.). ♂ pala.
8. ,, ,, *meridionalis* (Wallgr.). ♂ pala.
9. ,, ,, *contortuplicata* (Kirk.). ♂ pala.
10. ,, ,, *ceres* n. sp. ♂ pala.
11. ,, ,, *contortuplicata* (Kirk.). ♂ anterior trochanter.

Plate XL.—Distribution Maps.

MAP.
1. *Enithares chinai* Jacz. In S. Africa.
2. *Anisops* (*A.*) *sardea* H.S. In S. Africa.
3. ,, ,, *debilis* Gerst. and *Anisops* (*A.*) *hypatia* n. sp. In S. Africa.
4. *Nychia limpida* Stål. In S. Africa.
5. *Anisops* (*A.*) *poweri* n. sp., *Anisops* (*Anisopoides*) *aglaia* n. sp., *Sigara* (*S.*) *meridionalis* Wallgr., and *Micronecta citharistia* n. sp. In S. Africa.
6. The subgenera *Notonecta* and *Paranecta*. In the African continent.

Plate XLI.

FIG.
1. Flood-bed of Limpopo River, Main Drift near Messina.
2. Limpopo River " Gorge," near Messina ; locality for *Nychia l. limpida.*
3. Rietfontein Pan, Boksburg div., Transvaal ; locality for *Anisops* (*A.*) *sardea*, *Anisops* (*A.*) *varia*, *Anisops* (*Aoid.*) *aglaia*, etc.
4. Stream in Witpoortje Kloof, Krugersdorp, Transvaal ; locality for *Enithares v-flavum*, *Enithares sobria*, and *Anisops* (*A.*) *varia scutellata.*
5. Diep Kloof, Rouxville dist., Orange Free State. Pool in stream ; locality for *Anisops poweri* and *Micronecta citharistia.*
6. Birchleigh dam, Pretoria dist., Transvaal ; locality for *Micronecta dorothea* in *Potamogeton* and *Micronecta scutellaris* in open water between the reeds.
7. Makabusi River near Salisbury, Southern Rhodesia ; locality for *Enithares chinai*, *E. sobria*, *Nychia limpida*, *Micronecta monomatapae*, etc.
8. Drift in stream below Cango Caves, Oudtshoorn dist.



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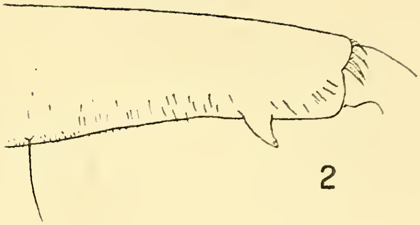

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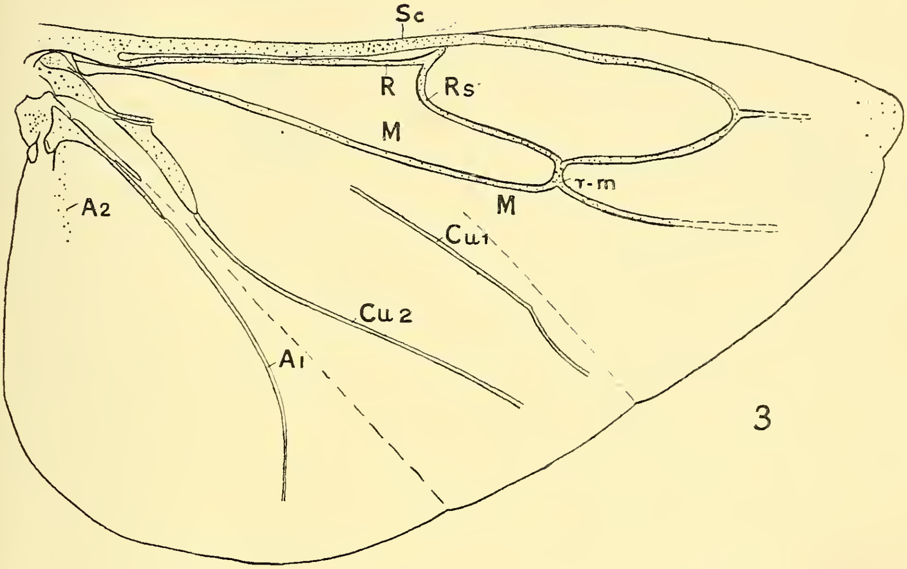

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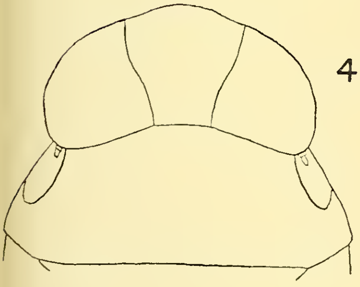

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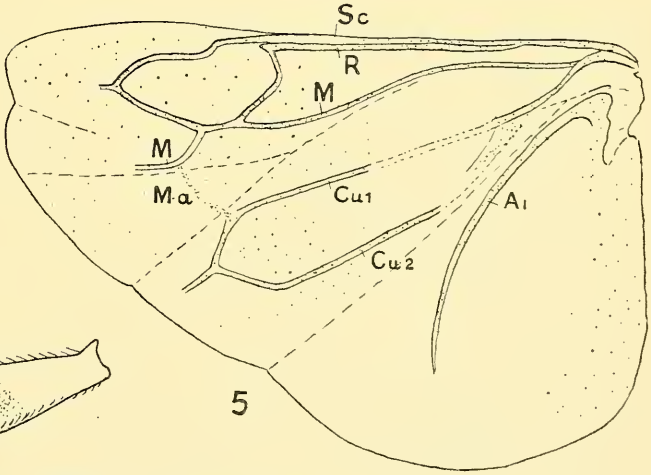

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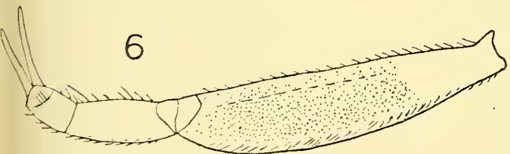

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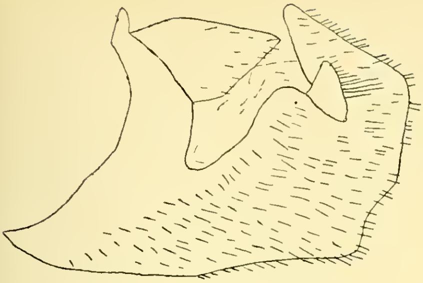
SOUTH AFRICAN NOTONECTIDAE.



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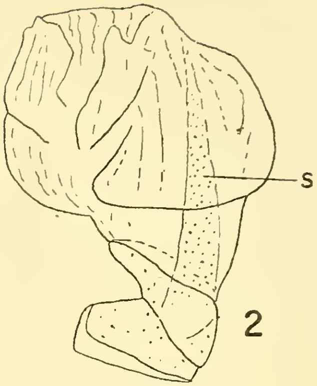

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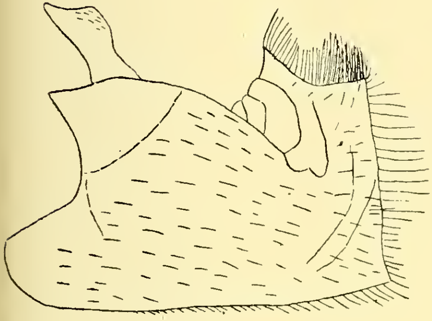

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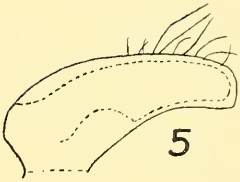

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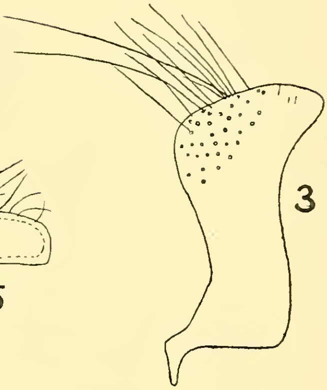

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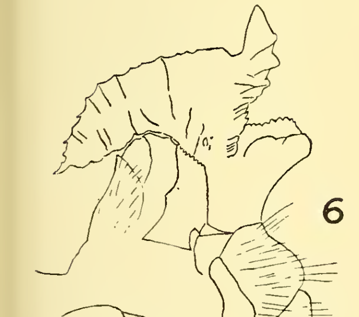

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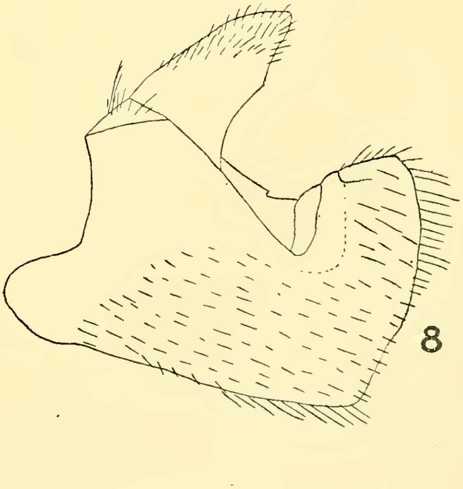

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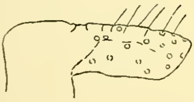

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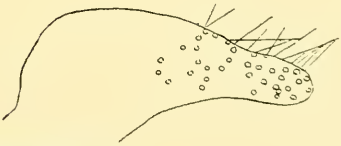

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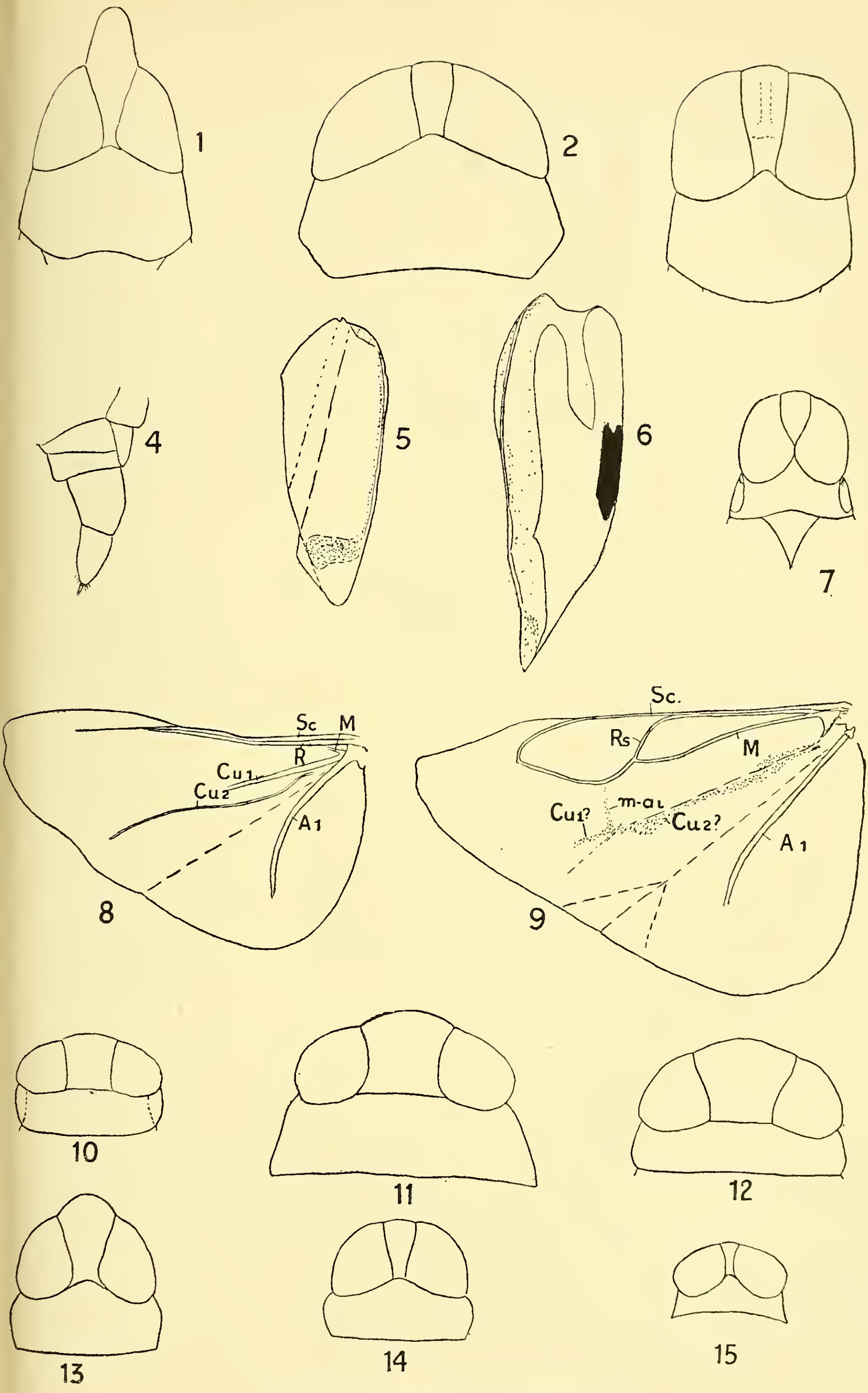

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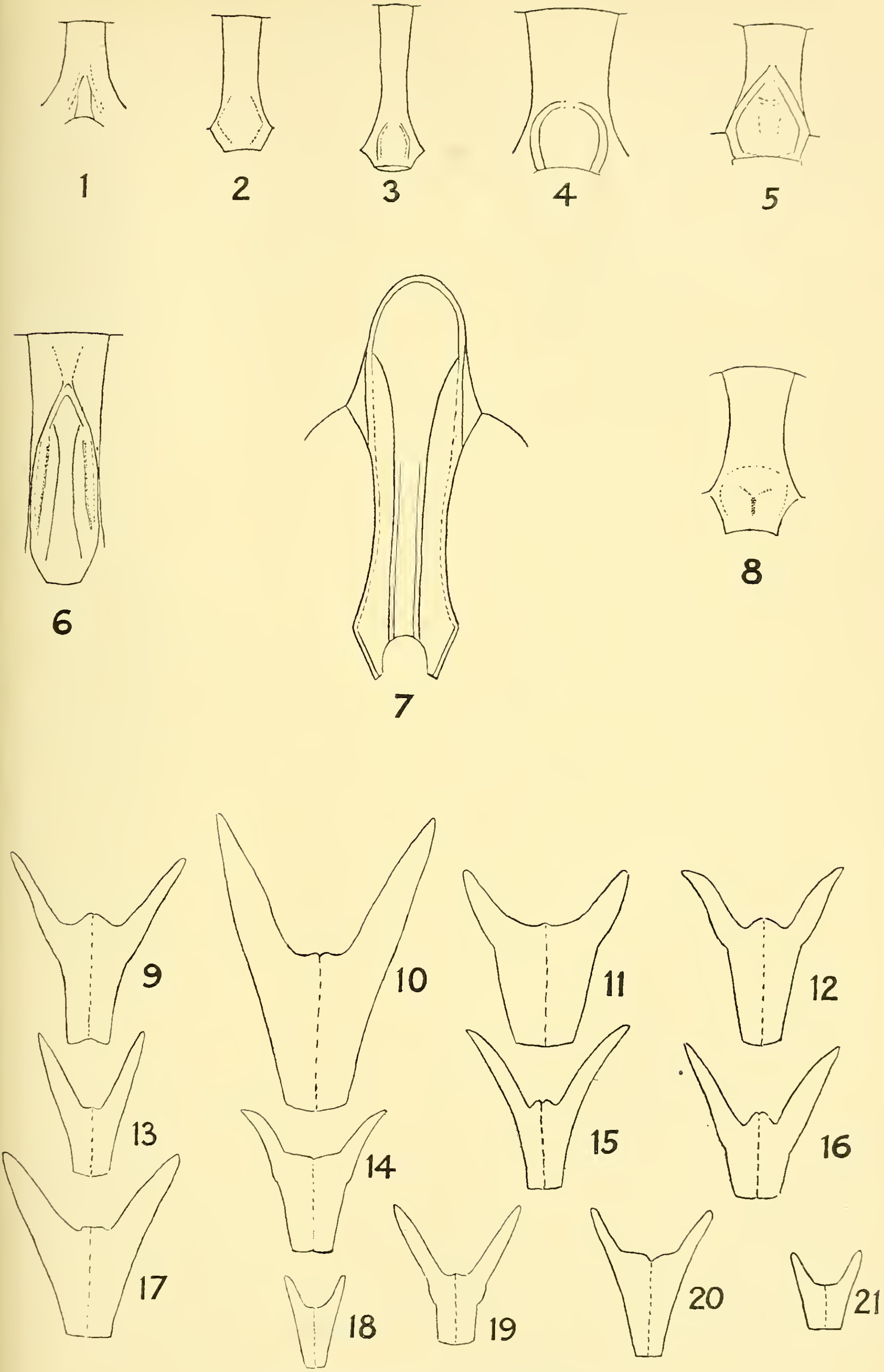
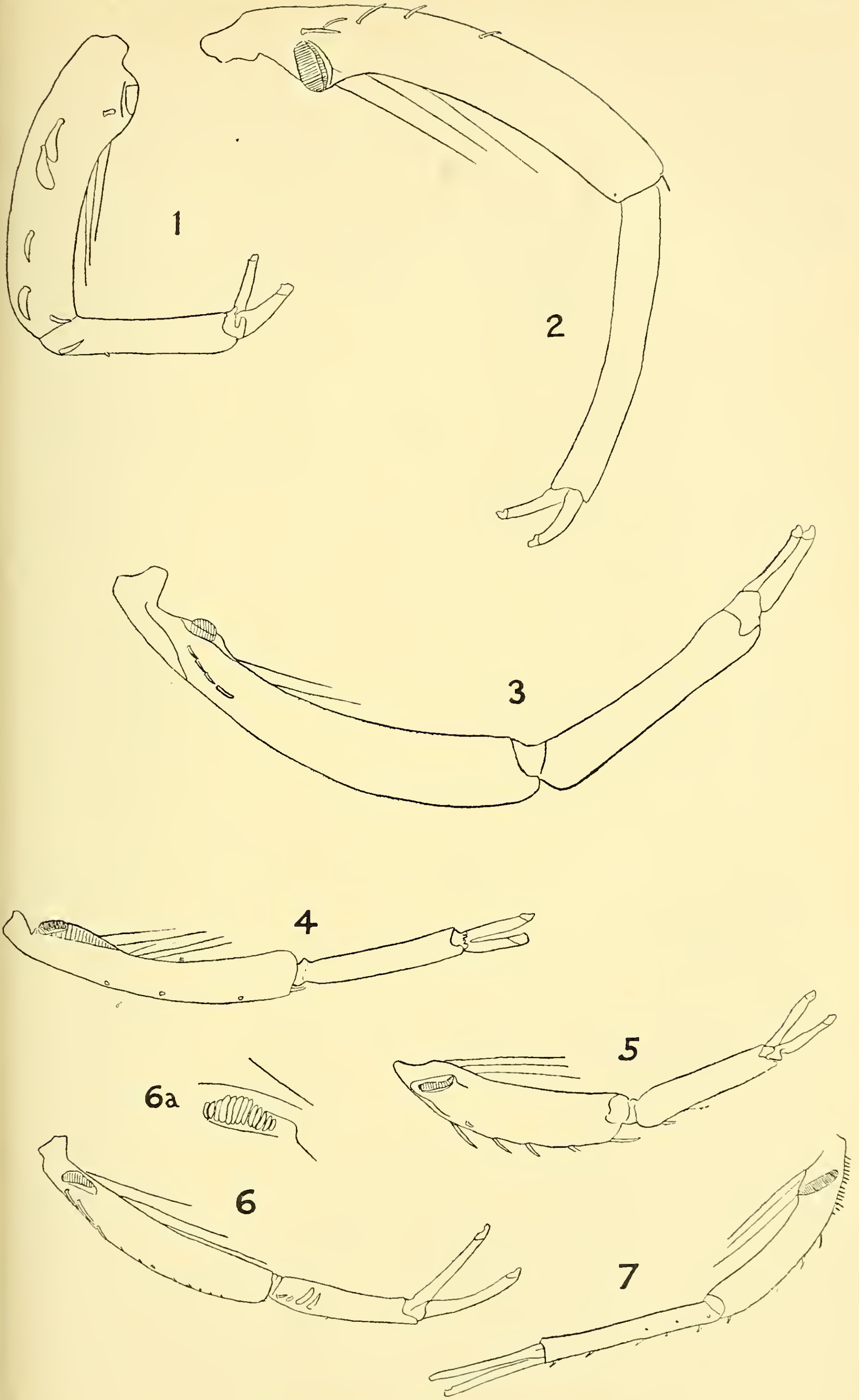


SOUTH AFRICAN NOTONECTIDAE.



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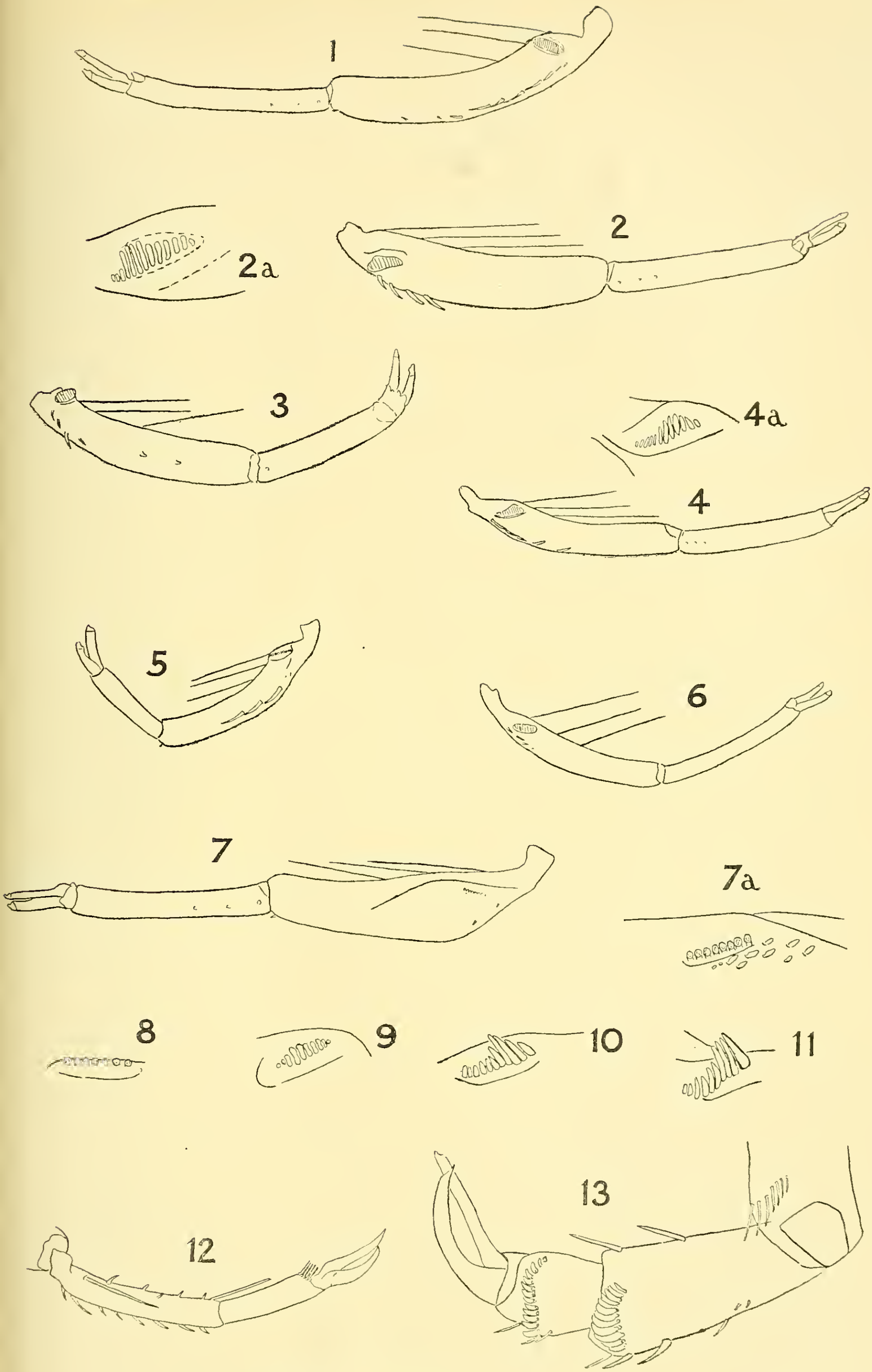

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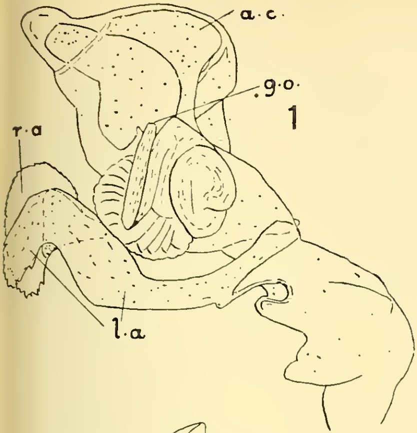

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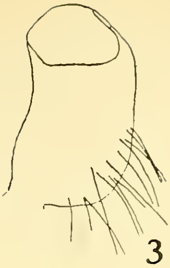
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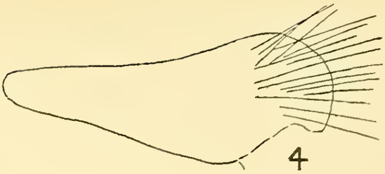
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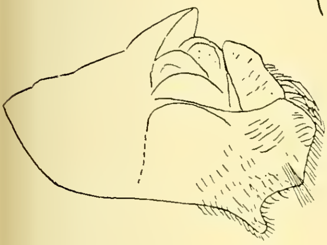
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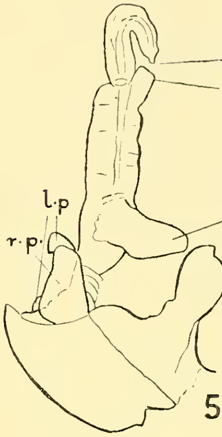

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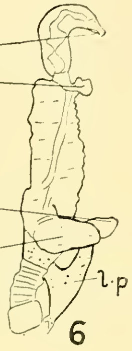

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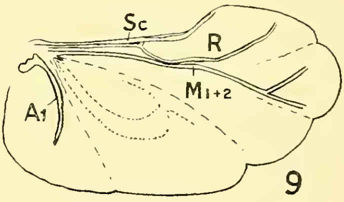

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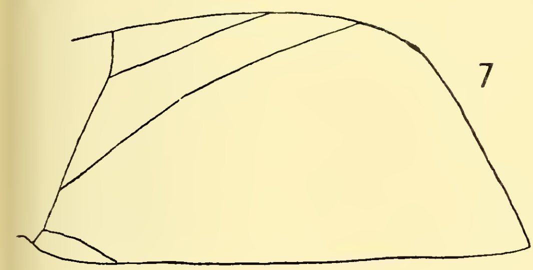
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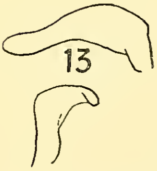
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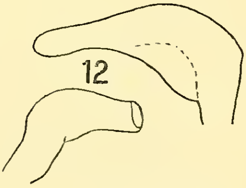
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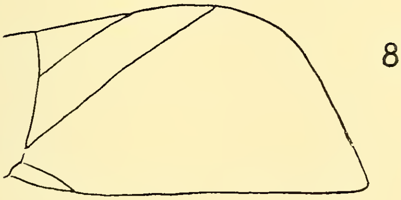
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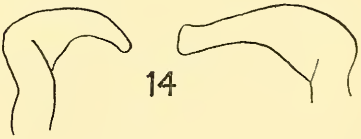
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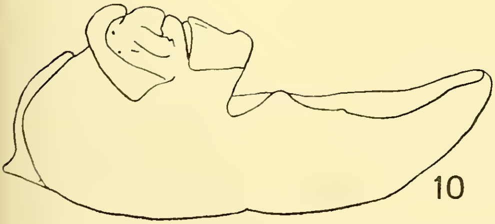
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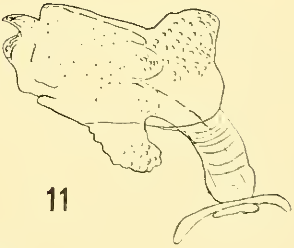
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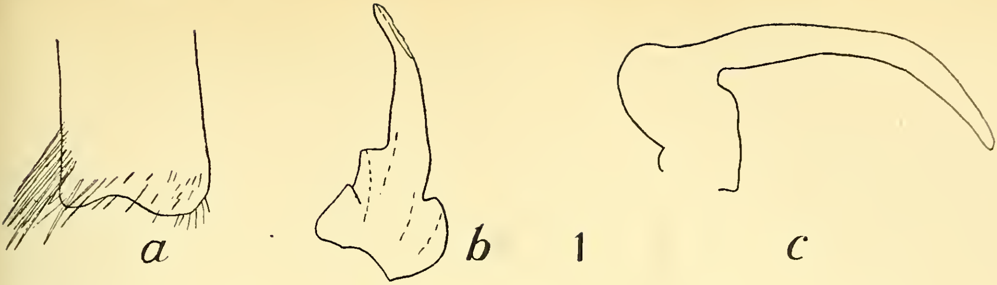
SOUTH AFRICAN NOTONECTIDAE.



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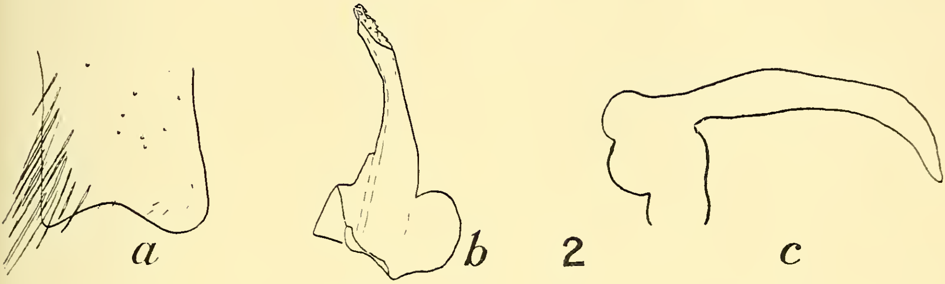

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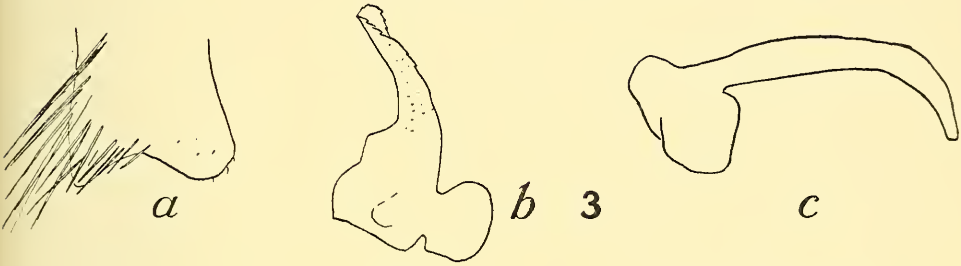

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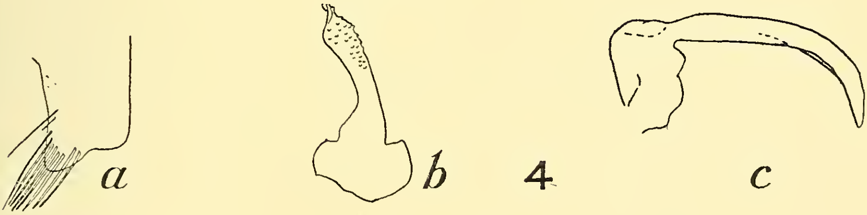

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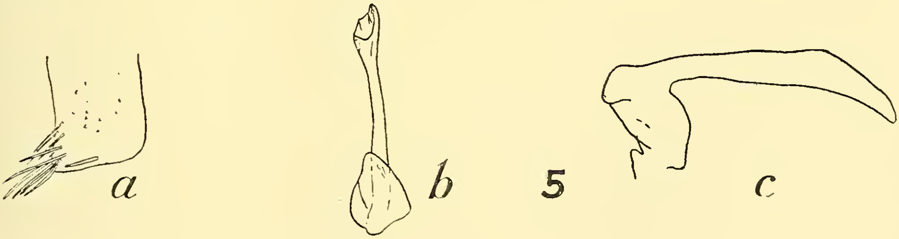

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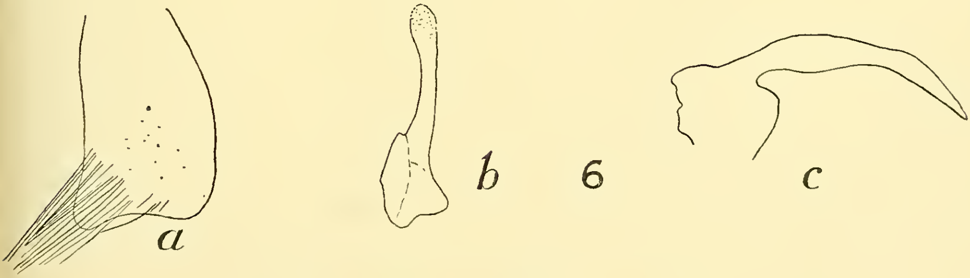

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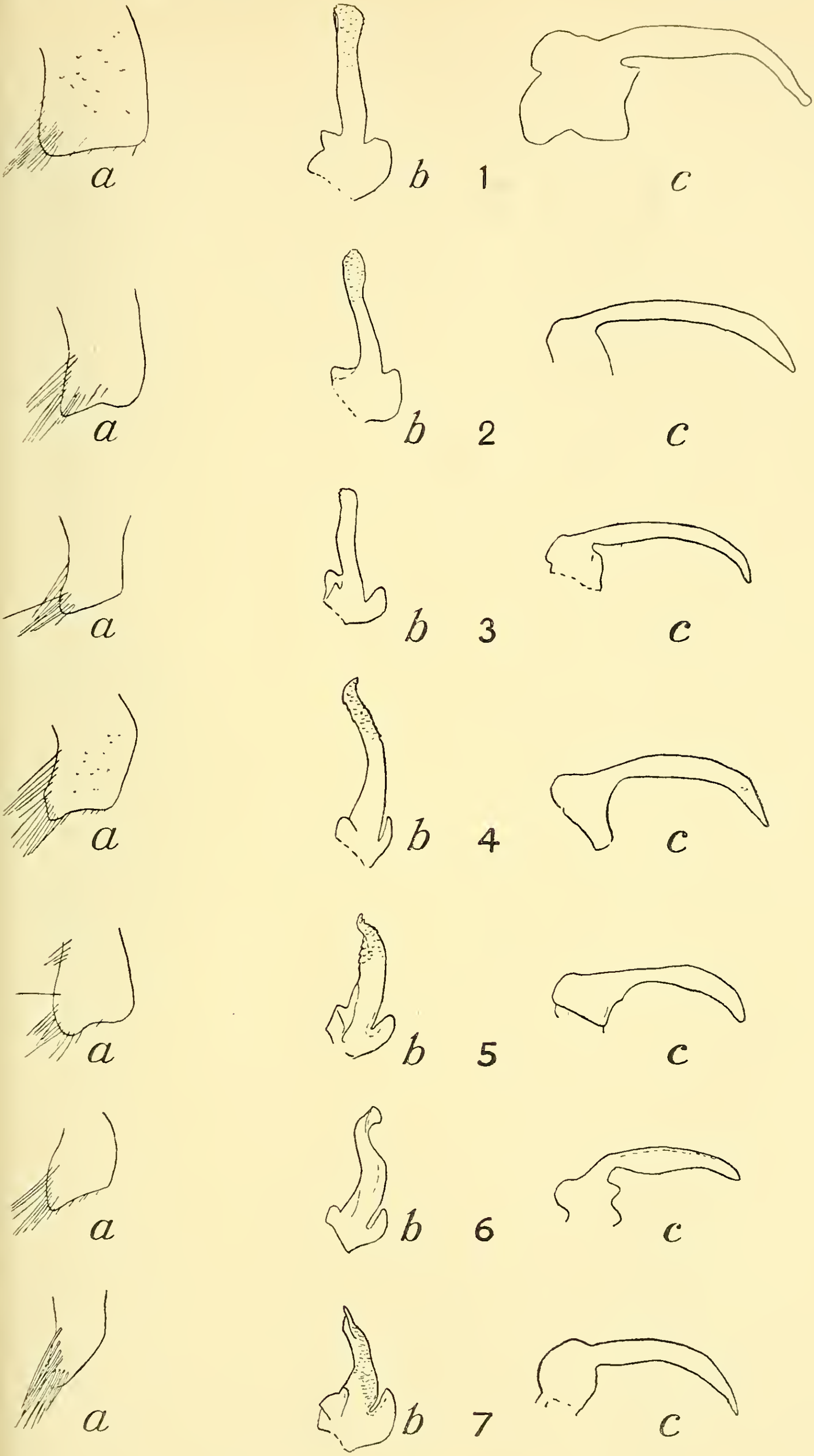
SOUTH AFRICAN CORIXIDAE.



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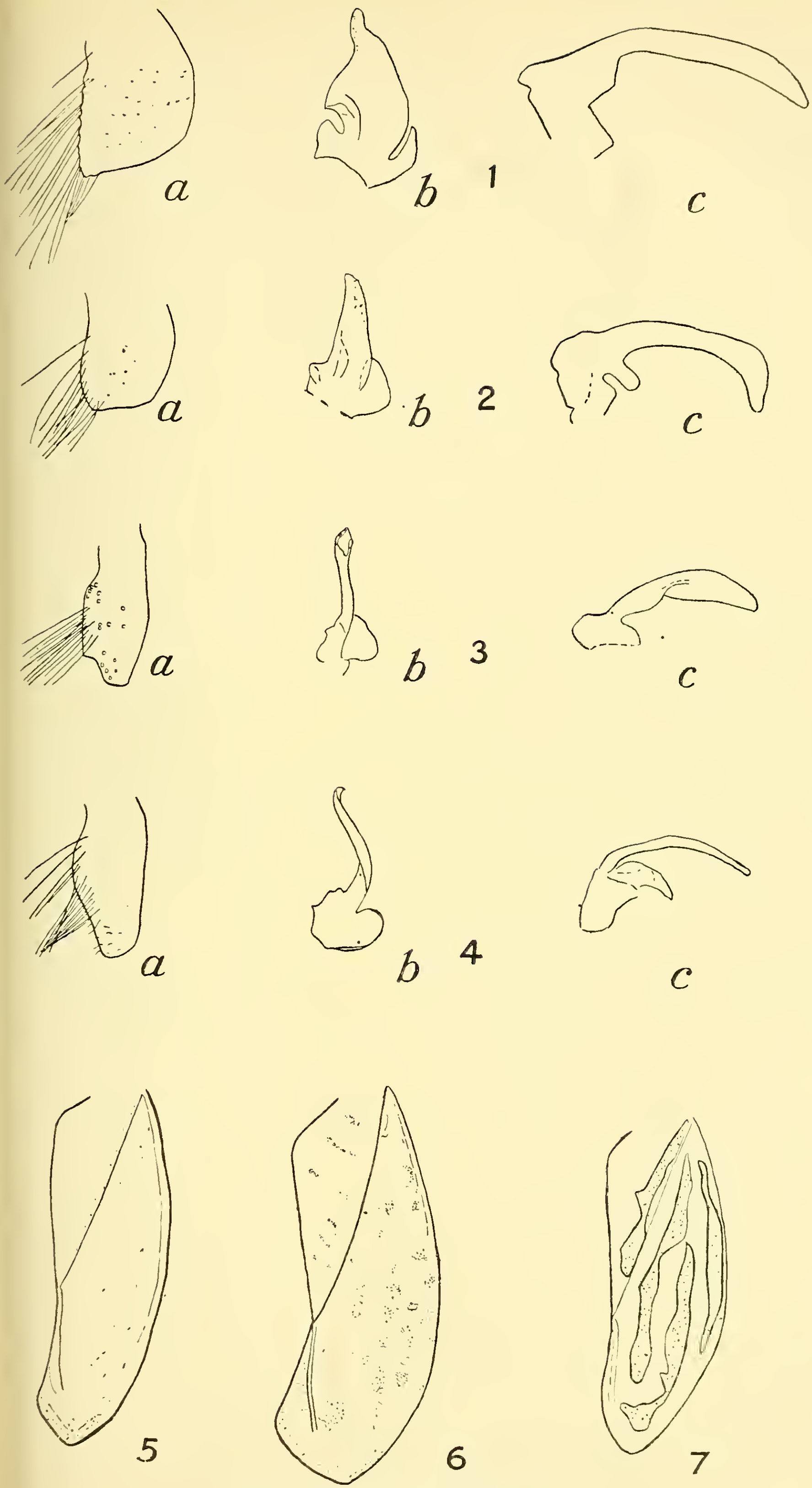

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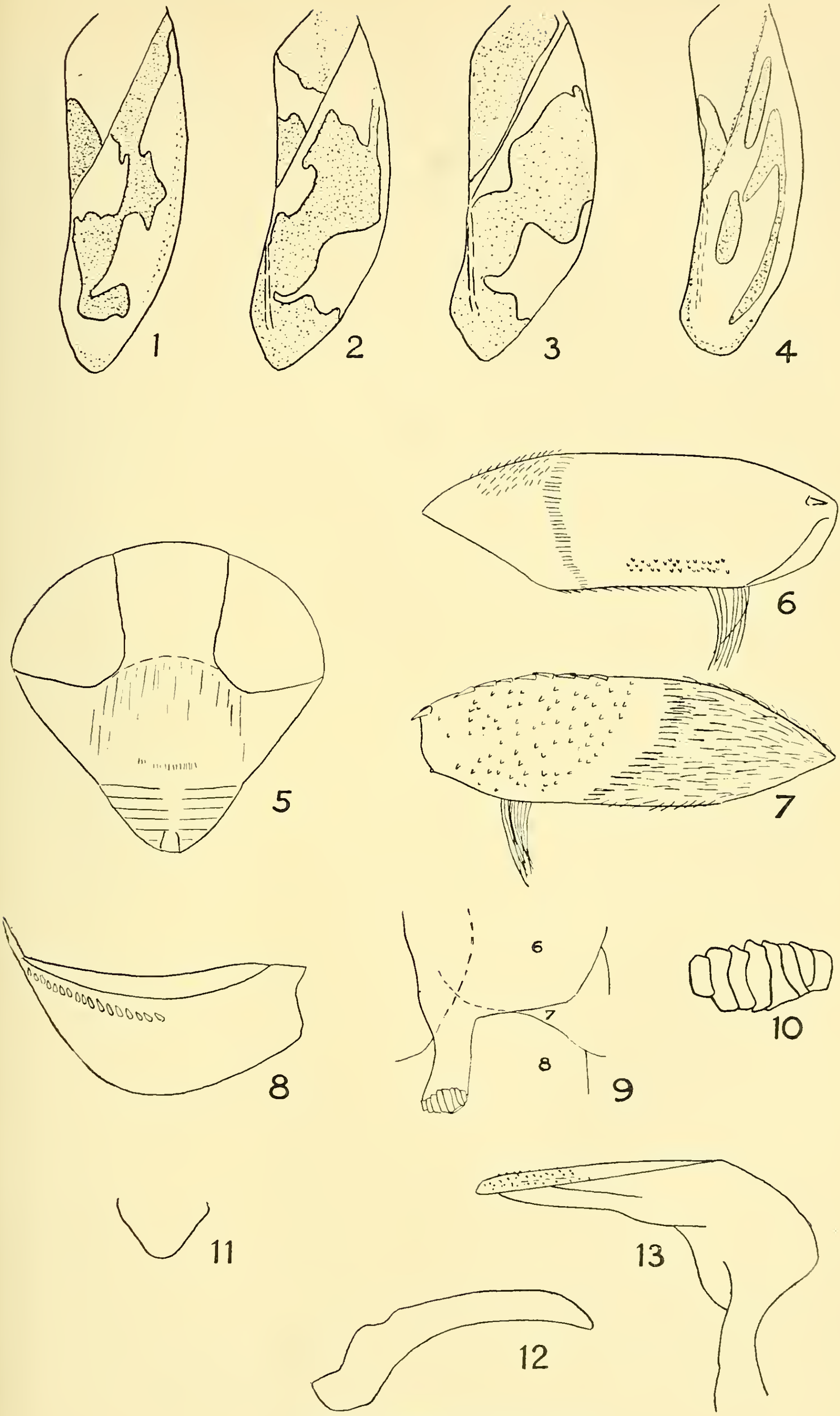

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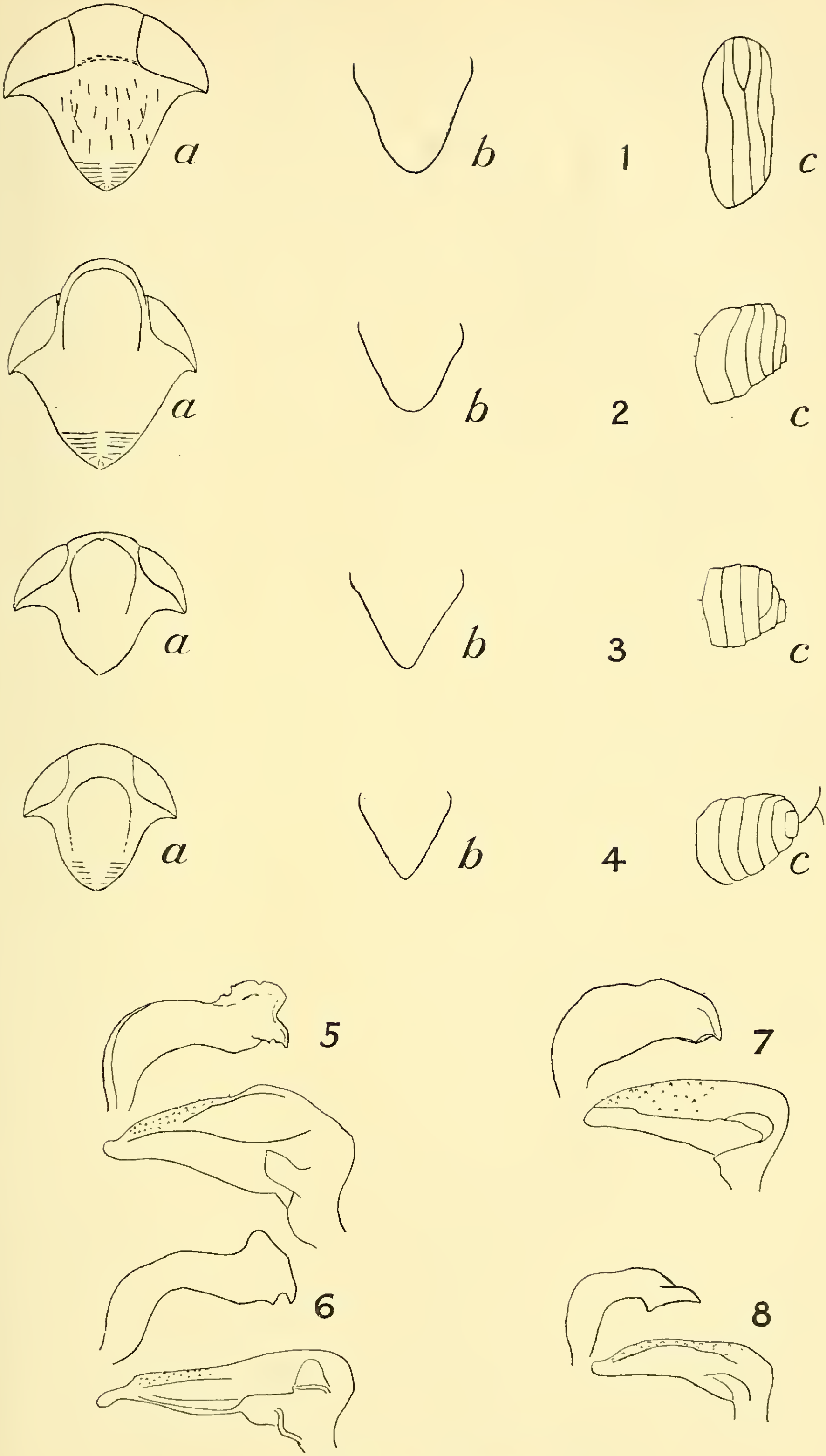

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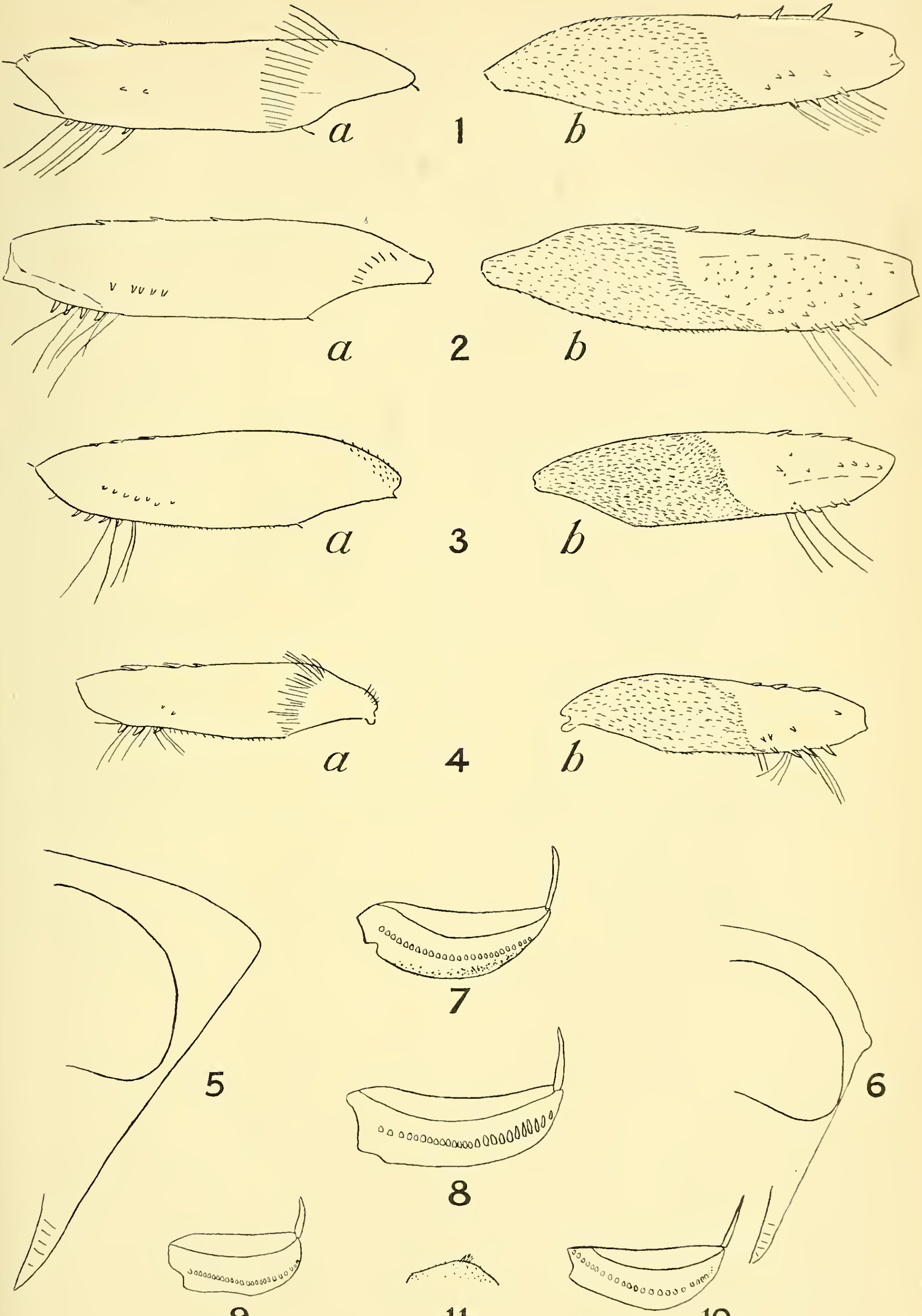

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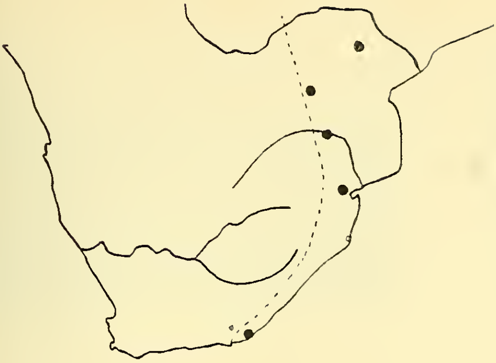
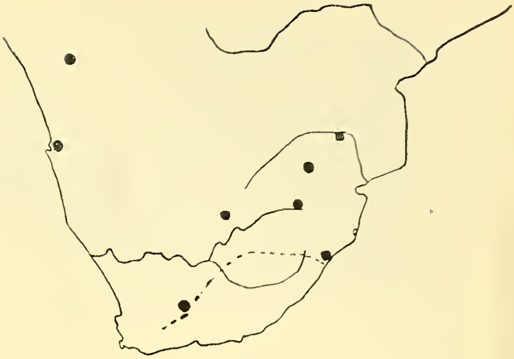


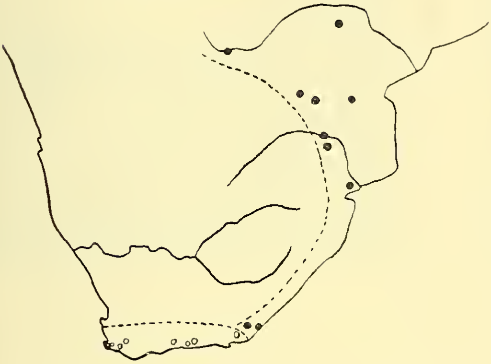
1

● *E. chinai.*



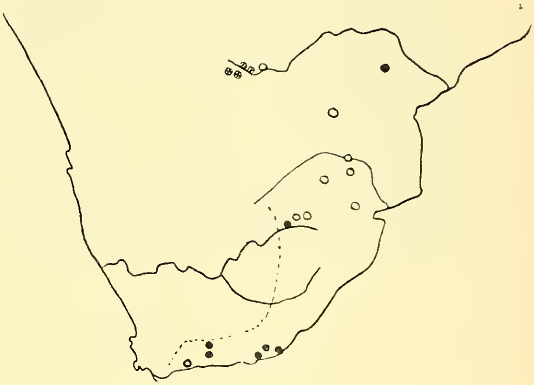
2

● *A. sardea.*



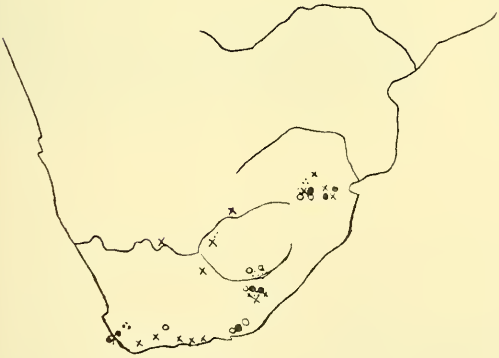
3

● *A. debilis.*
○ *A. hypatia.*



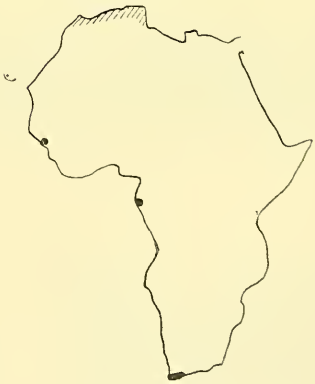
4

○ *N. l. limpida.*
● *N. l. limpida*, form *sappho* (with type).
* *N. l. bantu.*



5

∴ *A. poweri.*
● *A.* (*Aoid.*) *aglaia.*
× *S. meridionalis.*
○ *M. citharistia.*



6

//// *Notonecta* s.str.
● *Paranecta.*

SOUTH AFRICAN NOTONECTIDAE AND CORIXIDAE: DISTRIBUTION MAPS.

G. E. H. photo.

1

G. E. H. photo.

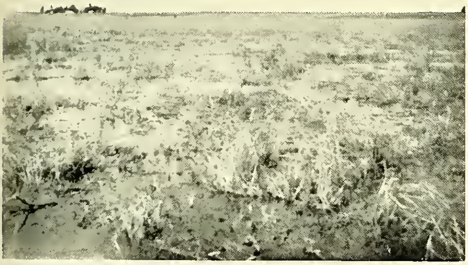
4

G. E. H. photo.

2

G. E. H. photo.

5



G. E. H. photo.

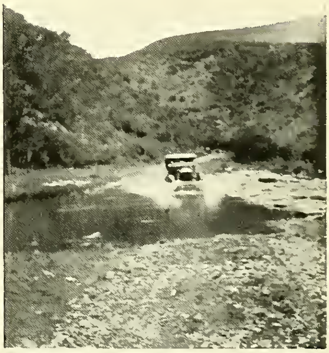
3

G. E. H. photo.

6

Gertrude Moss photo.

7



Winifred Simon photo.

8

SOUTH AFRICAN NOTONECTIDAE AND CORIXIDAE: SOME HABITATS.